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An International Forum
on the Diversity of Life on Earth...
research, conservation, education and wise use

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The goals of Canadian Biodiversity are to:

- * Publish articles, views and news on biodiversity*
- * Bridge the gaps amongst professional disciplines & the public*
- * Communicate information on Canadian & world biodiversity*
- * Express views on the needs & value of biodiversity research*
- * Enhance awareness of the role of biosystematic research & museum collections to conservation & wise use of biodiversity*
- * Discuss methods and philosophy of biodiversity conservation*
- * Review books and major articles on biodiversity*

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RIO DECLARATIONS AT EARTH SUMMIT

The Earth Summit agreements were framed for the benefit of people and the environment. Canadian Biodiversity is happy to bring to its readers the text of two of the declarations made at the Earth Summit held at Rio de Janeiro in June 1992. One of the declarations was by the governments gathered for UNCED, the United Nations Conference on Environment and Development, and the other was made by the NGOs or Non-Governmental Organizations at the Global Forum; the latter is planned for inclusion in our next issue. The reader may wish to compare these with the United Nations' World Charter for Nature, proclaimed in 1982, reproduced in Canadian Biodiversity Volume 2, Number 1, pp. 2-5, and the NGO's Earth Charter released at Rio in June 1992. For persons not able to obtain a copy of the text of the International Convention on Biodiversity from their government or the United Nations Environment Programme, the Canadian Centre for Biodiversity would be willing to send a copy; please supply us with your full address clearly printed.



UNCED Rio Declaration

The United Nations Conference on Environment and Development, having met at Rio de Janeiro from 3 to 14 June 1992, reaffirming the Declaration of the United Nations Conference on the Human Environment, adopted at Stockholm on 16 June 1972, and seeking to build on it, with the goal of establishing a new and equitable global partnership through the creation of new levels of cooperation among States, key sectors of societies and people, working towards international agreements which respect the interests of all and protect the integrity of the global environment and developmental system, recognizing the integral and interdependent nature of the Earth, our home, proclaims that:

Principle 1. Human beings are at the centre of concerns for sustainable development. They are entitled to a healthy and productive life in harmony with nature.

Principle 2. States have, in accordance with the Charter of the United Nations and the principles of international law, the sovereign right to exploit their own resources pursuant to their own environmental and developmental policies, and the responsibility to ensure that activities within their jurisdiction or control do not cause damage to the environment of other States or of areas beyond the limits of national jurisdiction.

Principle 3. The right to development must be fulfilled so as to equitably meet developmental and environmental needs of present and future generations.

Principle 4. In order to sustain development, environmental protection shall constitute an integral part of the development process and cannot be considered in isolation from it.

Principle 5. All States and all people shall cooperate in the essential task of eradicating poverty as an indispensable requirement for sustainable development, in order to decrease the disparities in standards of living and better meet the needs of the majority of the people of the world.

Principle 6. The special situation and needs of developing countries, particularly the least developed and those most environmentally vulnerable, shall be given special priority. International actions in the field of environment and development should also address the interests and needs of all countries.

Principle 7. States shall cooperate in a spirit of global partnership to conserve, protect and restore the health and integrity of the Earth's ecosystem. In view of the different contributions to global environmental degradation, States have common but differentiated responsibilities. The developed countries acknowledge the responsibility that they bear in the international pursuit of sustainable development in view of the pressure their societies place on the global environment and the technologies and financial resources they command.

Principle 8. To achieve sustainable development and a higher quality of life for all people, States should reduce and eliminate unsustainable patterns of production and consumption and promote appropriate demographic policies.

Principle 9. States should cooperate to strengthen endogenous capacity-building for sustainable development by improving scientific understanding through exchanges of scientific and technological knowledge, and by enhancing the development, adaptation, diffusion and transfer of technologies, including new and innovative technologies.

Principle 10. Environmental issues are best handled with the participation of all concerned citizens, at the relevant level. At the national level, each individual shall have appropriate access to information concerning the environment that is held by public authorities, including information on hazardous materials and activities in their communities, and the opportunity to participate in decision-making processes. States shall facilitate and encourage public awareness and participation by making information widely available. Effective access to judicial and administrative proceedings, including redress and remedy, shall be provided.

Principle 11. States shall enact effective environmental legislation. Environmental standards, management objectives and priorities should reflect the environmental and developmental context to which they apply. Standards applied by some countries may be inappropriate and/or unwarranted economic and social costs to other countries, in particular developing countries.

Principle 12. States should cooperate to promote a supportive and open international economic system that would lead to economic growth and sustainable development in all countries, to better address the problems of environmental degradation. Trade policy measures for environmental purposes should not constitute a means of arbitrary or unjustifiable discrimination or a disguised restriction on international trade. Unilateral actions to deal with environmental challenges outside the jurisdiction of the importing country should be avoided. Environmental measures addressing transboundary or global environmental problems should, as far as possible, be based on international consensus.

Principle 13. States shall develop national law regarding liability and compensation for the victims of pollution and other environmental damage. States shall also cooperate in an expeditious and more determined manner to develop further international law regarding liability and compensation for adverse effects of environmental damage caused by activities within their jurisdiction or control to areas beyond their jurisdiction.

Principle 14. States should effectively cooperate to discourage or prevent the relocation and transfer to other States of any activities and substances that cause severe environmental degradation or are found to be harmful to human health.

Principle 15. In order to protect the environment, the precautionary approach shall be widely applied by States according to their capabilities. Where there are threats of serious or irreversible damage, lack of full scientific certainty shall not be used as a reason for postponing cost-effective measures to prevent environmental degradation.

Principle 16. National authorities should endeavor to promote the internalization of environmental costs and the use of economic instruments, taking into account the approach that the polluter should, in principle, bear the cost of pollution, with due regard to the public interest and without distorting international trade and investment.

Principle 17. Environmental impact assessment, as a national instrument, shall be undertaken for proposed activities that are likely to have a significant adverse impact on the environment and are subject to a decision of competent national authority.

Principle 18. States shall immediately notify other States of any natural disasters or other emergencies that are likely to produce sudden harmful effects on the environment of those States. Every effort shall be made by the international community to help States so afflicted.

Principle 19. States shall provide prior and timely notification and relevant information to potentially affected States on activities that may have a significant adverse transboundary environmental effect and shall consult with those States at an early stage and in good faith.

Principle 20. Women have a vital role in environmental management and development. Their full participation is therefore essential to achieve sustainable development.

Principle 21. The creativity, ideals and courage of the youth of the world should be mobilized to forge a global partnership in order to achieve a sustainable development and ensure a better future for all.

Principle 22. Indigenous people and their communities, and other local communities, have a vital role in environmental management and development because of their knowledge and traditional practices. States should recognize and duly support their identity, culture and interests and enable their effective participation in the achievement of sustainable development.

Principle 23. The environment and natural resources of people under oppression, domination and occupation shall be protected.

Principle 24. Warfare is inherently destructive of sustainable development. States shall therefore respect international law providing protection for the environment in times of armed conflict and cooperate in further development, as necessary.

Principle 25. Peace, development and environmental protection are interdependent and indivisible.

Principle 26. States shall resolve all their environmental disputes peacefully and by appropriate means in accordance with the Charter of the United Nations.

Principle 27. States and people shall cooperate in good faith and in a spirit of partnership in the fulfilment of the principles embodied in this Declaration and in the further development of international law in the field of sustainable development.

PAPERS

"The Earth's Blanket": Traditional aboriginal attitudes towards nature

"...flowers, plants and grass especially the latter are the covering or blanket of the earth. If too much plucked or ruthlessly destroyed earth sorry and weeps[.] It rains or is angry & makes rain, fog & bad weather." (James Teit, ethnographer, unpublished notes on Nlaka'pamx, or Thompson, plant knowledge, ca. 1900, cited from Turner, Thompson, Thompson & York, 1990: 54).

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Understanding and living sustainably within a particular environment has been a matter of survival for the Aboriginal Peoples of Canada, as it has for Indigenous Peoples the world over. A definition of "Indigenous People", as "...a cultural group in an ecological area that developed a successful subsistence base from the natural resources available in that area" (Kuhnlein and Turner 1991:2) reflects the close relationship Aboriginal People have had with their environment, a relationship that embodies dependence, familiarity, awe, respect, and kinship. This article focuses on Aboriginal Peoples of western Canada in the examples used, but the concepts expressed are widespread in Aboriginal teachings.

Despite, or perhaps because of, their detailed knowledge of the natural world, Aboriginal Peoples have regarded many aspects of Nature as "powerful", or magical. There is a spiritual side of Nature, addressed in traditional ceremonies, prayers and "stories", going far beyond its modern role solely as a "resource" to be exploited by people in their quest for survival and the acquisition of wealth. The philosophy expressed in the introductory quotation, reflecting the power and persona of nature, and the necessity to use it carefully and not to abuse it, was widely taught to Aboriginal children and young adults by their elders.

"Never waste anything." Everything has a purpose, people were taught, even those things frequently regarded as useless by most people today. The sinew from a whale's back made the strongest kind of rope for the Nuuchah-nulth people of the West Coast of Vancouver Island; fine powder from sharpening giant mussel shells for chisels was used by the Ditidaht of Vancouver Island as a lubricant for the skin when people spun nettle fibre into string on their bare legs; salmon heads were used all along the Pacific Coast to make a rich, delicious and highly nutritious soup; the eyeballs of a bison were used for glue by the Blackfoot of Alberta; the ribs of a deer were softened, split into slivers and used for awls by the Secwepemc, or Shuswap, and other peoples. The bark of trees, generally removed and discarded in modern sawmilling, was used traditionally as a source of fibre, basket materials, medicine and even food (Turner and Hebda 1990; Gottesfeld 1992).

Red Alder (*Alnus rubra*) is a plant species that epitomizes the contrasting attitudes people have towards Nature. It is a tree of western North America, regarded by industrial foresters of the Pacific coastal region as a noxious weed that competes with commercial "fibre" species such as Douglas fir (*Pseudotsuga menziesii*). Alder is variously sprayed with herbicides, such as Round-up, girdled with special circular saws to kill it, or removed by cutting. Among Northwestern Aboriginal Peoples, however, it was, and still is, highly valued. In some mythical traditions, Alder was formerly a woman with red skin, transformed to her present state long ago as



a gift for other humans. Its soft, even-grained wood is an ideal fuel for smoking fish and meat, and for carving bowls, masks, and rattles. Its bark, which turns bright orange or red with exposure to air, was a major source of dye. It was used for colouring fishnets to make them invisible to fish, and for red-cedar or the giant arborescent bark (*Thuja plicata*) used in clothing, mats and ceremonial neck rings, providing a contrasting hue with the natural brown.

The cambium and inner bark tissues of red alder were eaten in spring by the Saanich and other Coast Salish Peoples of Vancouver Island. Alder bark is also the source of important medicines, used by Aboriginal Peoples for treating a variety of ailments from tuberculosis and internal haemorrhaging to skin infections. Preliminary screening for antibiotic properties at the Department of Botany of The University of British Columbia showed it to be effective against a wide range of bacterial pathogens. Its bark, like that of willows, contains salicin, with properties similar to aspirin (Lauriault 1989). One need only look at the story of western yew, *Taxus brevifolia* (see McAllister and Haber 1991) to find an example of a tree hitherto regarded as "useless" whose commercial value has skyrocketed following the discovery of a promising anti-cancer compound, taxol, in its bark. Red alder may well become another "yew story". Aboriginal People have known, used and valued both of these species for centuries.

Among the Kwakwaka'wakw (Kwakwaka-speaking People, formerly called Kwakiutl) of coastal British Columbia, everything used was honoured with a prayer, acknowledging its healing or nurturing role and its power to help. The following prayer, recorded by ethnographer Franz Boas (translated from Kwakwaka), is addressed by a medicine gatherer to an alder tree along a river bank. The man wishes to use the alder's bark to treat his wife, who is spitting blood [from tuberculosis]:

I have come to ask you to take mercy, supernatural-Power-of-the-River-Bank, that you may, please, make well with your healing power my poor wife who is spitting blood. Go on, please, pity me for I am troubled and, please, make her well, you, Healing-Woman, --and, please, stop up the source of blood, you Causing-go-Heal-Woman, and, please, heal up the cause of trouble of my poor wife, please, you, great Supernatural One... (Boas 1930:237-238).

Four pieces of the bark were carefully removed, taken home, and administered with additional prayers to the "Healing-Woman" alder. All medicine harvested must be used; if it is thrown away or wasted, the person could suffer hardship in some way, because of the disrespect shown. The practices of careful harvesting and use of such materials allowed for their continued utilization over many generations - in other words, sustainability.

What does all this mean for protection of Biodiversity? Aboriginal Peoples need to use their environment, and the other living things in their ecosystems, for survival, just as all of us do. However, the attitude of respect, gratitude and honour, and the spiritual relationship humans have had with Nature in traditional cultures, is important in determining *how* they used their environment. Religious attitudes in traditional societies may be metaphorical guidelines for sustainable living. Prayers, stories and ceremonies abound in the Aboriginal societies of Canada and elsewhere that teach people the

principles of sustainability: Take only what you need, and do not waste what you take. *Harvest with care. Honour and appreciate everything you get and everything around you. Share with others; do not hoard. Observe carefully for signs of scarcity or overuse, and if you find them, change your use patterns. Remember, Nature can affect your life, for good or for bad, depending on how you treat it.*

If Society at Large were to uphold these principles, and follow them, doubtless we would all be more successful at living sustainably and preserving the other life forms of the planet.

ACKNOWLEDGEMENTS

My sincere gratitude goes to the many wise and knowledgeable Aboriginal People who have taught me about traditional plant use. I would especially like to acknowledge the late Annie York (Nlaka'pamux), the late Edith O'Donaghey (Stl'atl'imx), the late John Thomas (Ditidaht), Mary Thomas (Secwepemc), Kenneth Eaglespeaker (Blackfoot) and Kim Recalma-Clutesi (kwakwaka'wakw) for the information contained here. Robert D. Turner, Alison Davis and David Bosnich provided helpful editorial council.

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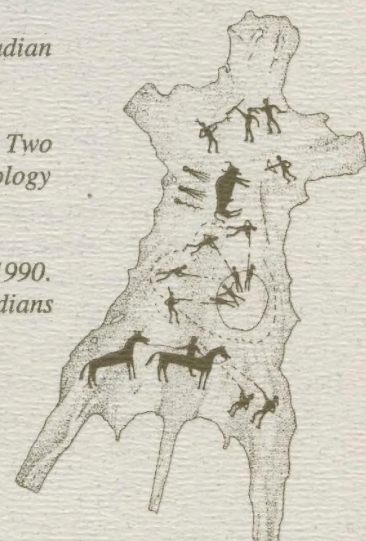
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The rosy or Madagascar periwinkle, *Catharanthus roseus* (L.), is a small rose-colored flowering plant native to dry forests in Madagascar. It belongs to the dogbane family, Apocynaceae. Drugs from the rosy periwinkle save hundreds of children each year from childhood leukemia. The worth of periwinkle drugs was found serendipitously, when a research group leader, Dr. Robert L. Noble, Department of Medical Research at the **University of Western Ontario**, following clues from Jamaican traditional knowledge, was testing periwinkle extracts in treatment of diabetes. He found the test rats succumbing to a *Pseudomonas* bacterial infection, which he traced to a drop in lymphocytes counts, one of the white blood cells. Presenting a paper at a conference suggesting use of the extract in treating leukemia, drew the attention of Dr. Gordon H. Svoboda, in the **Lilly Research Laboratories**, who had also found anticancer properties in periwinkle extracts. Five years after its discovery Lilly launched new drugs. With periwinkle extract vincristine, the survival rate of children with acute lymphocytic leukemia is now 90%, while remissions of patients with Hodgkin's disease has increased from 19% to 80% (Barr, 1977, *A century of medicine at Western*; Huxley, 1984, *Green inheritance, the World Wildlife Fund book of plants*). In 1985 sales of vincristine and vinblastine were approximately \$100 million, 88% of which was profit for the company; sale of both alkaloids, vincristine and vinblastine, exceeds \$180 million per year (Wilson 1992). The **Universities of Western Ontario and British Columbia** benefitted from royalty payments.

The periwinkle has other uses. As a gardening annual it has won 13% of the market, up from a mere 3% 10 years ago (*Organic Gardening* 40(3): 20, 1993). Furthermore, tests at **Gujarat Agricultural University** showed that exposure to *Catharanthus roseus* plants killed nearly 100% of harmful nematodes in potted soil.

While cancer-fighting properties of rosy periwinkle compounds were being discovered and developed, the forests of Madagascar, where the periwinkle originated, were disappearing. At least 80% of the forests are already gone, to provide space for agriculture for the island's growing population, for firewood and charcoal. This is especially distressing because of the high proportion of endemism (species found nowhere else) in Madagascar. About 80% of the flowering plants and 98% of the amphibians are endemic to the mini-continent. The rosy periwinkle itself is not rare; it has been domesticated and can be purchased at florists. Furthermore, this periwinkle has escaped from cultivation and is naturalized in many parts of southern U.S., subtropical and tropical regions. But loss of forests in Madagascar is threatening many plant and animal species with extinction. For example, Madagascar has 54 species of mammals threatened with extinction. Another periwinkle, *Catharanthus coriaceus*, is approaching extinction as the last of its natural habitat in the Betsileo region of the central highlands of Madagascar, is cleared for agriculture (Wilson, 1992, *The diversity of life*). Deforestation also threatens the ecological services provided by forests - soil no longer protected from erosion is impacting Madagascar's coral reefs. How many potential new drugs and coral reef life forms will be lost as the forest remnants disappear?

The rosy periwinkle was originally named *Vinca rosea* by Linnaeus. Later study showed that the rosy periwinkle was distinct in a number of characters from the type species of *Vinca*. These include characteristics of the blossoms, seed pods, and leaves. A new genus, *Catharanthus*, was erected for the rosy periwinkle, three other periwinkles in Madagascar and one in India. Although taxonomic changes in names like this sometimes annoy someone tracking down literature on a species, they do represent a real advance in knowledge. Moreover, these biosystematic advances provide economic as well as scientific benefits. If a pharmaceutical company wanted to examine other periwinkles for leukemia-fighting properties, it could save millions of dollars by focussing its research on the more promising species in the genus *Catharanthus*. Excellence in biosystematic research underpins good science, conservation and business.



Rosy or Madagascar Periwinkle, Catharanthus roseus (L.)

Report on the workshop on traditional ecological knowledge and the biodiversity convention, October 14-16, 1992

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The Workshop was hosted by the Biodiversity Convention Office of Environment Canada, with support from the International Development Research Centre, Forestry Canada and the Canadian Museum of Nature. It took place in Peterborough, Ontario, with one evening's events hosted by the Curve Lake Band. The 25-30 participants came from North, Central and South America and from Africa.

OVERVIEW

On matters related to the Biodiversity Convention, most of the indigenous participants pointed out that, although they could raise issues for discussion, they were not empowered to unilaterally propose or endorse specific recommendations without referring back to their various constituencies.

Therefore, much of the discussion focused upon what needs to be done to enable indigenous communities to consider the provisions of the Biodiversity Convention and decide what role to play in its implementation. There was general agreement that four main issues need to be addressed as a foundation for embarking upon this process. These were:

- * Partnership as the basis for action
- * A community-driven process
- * Information circulation
- * Access to supporting funds and institutions.

These issues formed the basis for a summary of the workshop proceedings that was delivered to the other workshops by Brooklyn Riviera, from Nicaragua. More detail on these issues is provided below:

1. PARTNERSHIP AS THE BASIS FOR ACTION

It was stated repeatedly and emphatically that conventional approaches for involving indigenous peoples and communities, often designated as "consultation" or "participation", were ambiguous and unsatisfactory; that an agreed partnership offers the only sound basis upon which indigenous peoples would be prepared to share their knowledge with the agencies responsible for implementing the Biodiversity Convention.

2. COMMUNITY-DRIVEN PROCESS

There was consensus that the evolution of such partnerships must be community-driven. However, it was acknowledged that there are few if any existing methodologies for achieving this. Several participants stated that this should be the implementation process. Two questions were singled out:

How to convert/translate the legal and scientific language and concepts of the Convention into terms which connect with local peoples' experience and ways of conceptualising their worlds?

Having accomplished this, how to present the Convention in ways which will provide space for indigenous communities to take the initiative in responding according to their local interests and priorities?

3. *INFORMATION CIRCULATION*

The Biodiversity Convention and its proposed implementation process was new to many, as were other post-UNCED programmes and agencies to which the Convention relates, for example, Agenda 21 and the Global Biodiversity Strategy. There was also a lack of information on the actions that other indigenous groups may be contemplating regarding the Convention. These information needs fell into four categories:

- The Convention itself, and its provisions regarding indigenous peoples.
- Governmental and intergovernmental agencies engaged in implementation.
- Critical events in the implementation process.
- Activities of other indigenous organisations and NGO's.

It was felt that an effort to devise an appropriate method for engaging indigenous communities in the implementation process could be complemented by an information process which could connect with, and respond to, community deliberations. Two information channels were identified:

- To gather and collate pertinent information on agency activities and responsibilities and on critical events in the implementation process.
- To devise a means of circulation this to interested indigenous groups and communities.

4. *ACCESS TO SUPPORTING FUNDS AND INSTITUTIONS*

It was pointed out that a real partnership could not evolve unless the indigenous groups could gain direct access to funds. In this context, there was much discussion of external sources such as the Global Environmental Facility (GEF) and the Indigenous Peoples Fund (IPF). The emphasis was upon "direct access" as opposed to the current situation whereby indigenous groups are invariably connected to these agencies and funds through intermediary organisations.

Indigenous delegates from North America, pointed out that it seems that they do not qualify for access to either of these sources, although in terms of environment and development, their situation may often resemble those of indigenous peoples in Central and South America.

One informant pointed out that the operating procedure for the GEF is not yet final and that there may currently be an opportunity to influence mechanisms for access.

The structure of the IPF was advanced as an emerging model whereby indigenous groups could gain direct access to funds rather than proceeding through intermediate advocacy groups.

FUTURE ACTIONS AND PROCESS

Two events were singled out for monitoring or attendance.

The Honourable James Bourque offered to convey the results of the workshop to the UNEP Conference on Implementation of the Biodiversity Convention, to take place in Costa Rica, November 14-20, 1992.

Patrick Karani (African Centre for Technology Studies-ACTS) invited participants to this projected meeting: "International Conference on the Convention on Biological Diversity", January 26-29, Nairobi.

CONCLUSIONS AND RECOMMENDATIONS OF THE ECO-ED WORKSHOP ON TRADITIONAL ECOLOGICAL KNOWLEDGE AND THE BIODIVERSITY CONVENTION

Peterborough and Curve Lake Reservation, October 14-16, 1992

We have analyzed the process of biodiversity conservation according to the Biodiversity Convention and have reached the following conclusions:

1. The process of biodiversity in each country is defined by indigenous people. They own land, resources and nature and have knowledge and experience. Indigenous people are key players in the process of conserving biodiversity. They want partnerships with other people - governments, scientists etc. - and invite them to assist, facilitate and work together with them to conserve biodiversity.
2. There is a need to encourage a grassroots-driven process. Workshops like this and other meetings can promote interchange of knowledge and concerns and build commitment. It is also important that people in communities be included, to ensure that the knowledge and experiences of indigenous people - as expressed in their language, culture and traditions - is a part of the process of biodiversity conservation.
3. There should be exchange of information on events, organizations and studies relating to biodiversity conservation. Indigenous NGOs should be structured so they can exercise their inherent right to govern themselves and their resources. The Biodiversity Convention should be available to them in their own language.
4. Access to funding should be facilitated for indigenous people. They are not generally the direct beneficiaries, because governments may appropriate monies intended for indigenous people and NGOs and use them for their own policies and programs. This creates a dependency on and control by governments. Some funds should be available as loans to enable communities to undertake biodiversity conservation activities.

A proposal on environmental education for the Americas

Workshop at the Global Forum 92, Rio de Janeiro, June 1-12, 1992

Elaborated for: *JOSE MOYA HERNANDEZ*
Co-ordinator General of "*FORJA OF VENEZUELA*"

Présentation: Specialist Group of "*FORJA OF VENEZUELA*"

I. INTRODUCTION

It is inconceivable that "sustainable development" can be achieved without people being consciously prepared for it. In other words, it is utopic to think that the progress of a people can ignore its educational process. It is also important to understand that training people is a fundamental need that cannot be satisfied by schools alone. It is a need that - today more than ever - demands to be an integral part of life in the public and private sectors.

The poor level of education at all levels of society is well known, and there are many reasons for it. This situation runs adjacent to many difficult environmental problems affecting the planet, whose origins and consequences are also known -- but which have more serious effects among the underdeveloped and unprotected peoples of our Continent.

This is why we must first agree to inter-relate in a better way. Secondly, to identify our common needs, and thirdly, to decide how to jointly face our problems.

This is where our interests must begin to be focused -- and, if possible -- where we must establish co-operative links and reciprocity with the governments in the North, with the United States and Canada, in order to promote educational action that allows our people to attain a balanced environmental awareness adapted to the requirements of sustainable growth. That is why we must imbue this world meeting not with a theoretical or esoteric focus -- but rather with a decidedly practical one. This proposal is essentially derived from that notion. It is a feasible, inexpensive, and easily integrated proposal issuing from experiences we have begun to apply in Venezuela, through the Movimiento Ambientalista Popular Venezolano (Venezuelan Popular Environmentalist Movement) -- and through links with public and private organizations devoted to education and the country's production processes.

Finally, it is necessary to stress that environmental Education, both formal and non-formal, is the departure point of this participative and integrative journey, spurred on by the high level of concern that the people are beginning to show towards environmental problems. This phenomenon should not be ignored; instead it should serve as the impetus for sincere and profound action taken to ensure the participation of everybody who wishes to improve the environment and the quality of life on this planet.

II. CONTENTS:

With respect to the earlier-mentioned criteria, the role played by Non-Governmental Organizations (NGO's) is fundamental and involves the following goals:

1. To increase educational action so that the people can attain an adequate environmental culture. Towards this end, the following tasks are essential:

- a) To carry out permanent public campaigns intended to awaken public consciousness of the need to improve the environment.
- b) To organize and publish communication methods of our own.
- c) To organize workshops, seminars, conferences, courses, field workshops, meetings, etc. on environmental problems and their alternative solutions.
- d) To sponsor and promote specific, environmentally oriented programs in public and private schools.
- e) To diversify environmental education methods and to place them under Umbrella Organizations, duly created.
- f) To increase the level of action regarding long-term environmental claims and to improve follow-up procedures.

These activities stem from NGO's operating plan, and this proposal is intended to reaffirm, redirect and integrate them with Participating Organizations by mutual accord.

- 2. To promote, at the community level, new and improved forms of social participation where people feel devoted to, and can identify with, the interests of solving corresponding community problems. Towards that objective, it is necessary to:
 - a) Fully divulge environmental problems.
 - b) Propose and co-ordinate preparatory meetings and democratically participative assemblies.
 - c) Stimulate the creation of Community Organizations which issue from a sincere and voluntary vocational belief and have horizontal organizational schemes.
 - d) To rely upon the respective media to effect planned activities.
 - e) To lobby among competent Authorities for organizational backing to guarantee the functioning of Social Organizations until they can stand on their own.
 - f) To promote the creation of Federative Organizations as a way of supporting, training and sustaining local NGO's, while showing respect for their independence and autonomy.
 - g) To foster -- under the auspices of an Evaluating Register -- the awarding of prizes and the acknowledgement of outstanding participation from individuals, Institutions, and Social Organizations.

3. To achieve a close and permanent relationship with the Media in order to:

- a) Improve media treatment and follow-up of claims of verified environmental problems.
- b) The granting of fixed spaces to be administered by Environmental Organizations.
- c) Improving their commercial advertisements and standard programs by supporting them with environmental education guiding principles, which stimulate orderly social participation, motivate creativity and demonstrate

respect for the individual and family.

d) To sponsor and evaluate the passing and enforcement of a Code of Ethics for the Media.

4. To generate strategies needed to co-ordinate with authorities all possible actions designed to rescue, re-orient, and improve the formal education system. Towards that goal, it is essential:

a) To organize Joint Events with Teachers, Planners, Education Authorities, and other Community Organizations in order to revise and update the different programs of study and to adapt them to each community's needs and characteristics.

b) To establish direct mechanisms -- integrated by adjoining sectors -- to carry out permanent evaluations and improve syllabus designs.

c) To design and apply ideal methods to train teachers at all academic levels on basic environmental aspects.

d) To require that Higher Education Institutions, especially Teacher Training ones, offer specialized courses in environmental themes such as territorial planning, regulation, environmental impact, legislative compendium and administrative procedures.

e) To create Information and experience exchange Networks at the Local, Regional, National and International levels.

5. To establish permanent links with labor unions and entrepreneurial guilds so as to increase their participation in environmental improvement programs. Towards this goal it is essential:

a) To establish a regimen of periodic meetings and activities with Said Organizations.

b) To rely upon training methods for workers which are related to their daily environmental areas.

c) To establish appropriate mechanisms to evaluate and improve workers' traditional environments.

d) That these Organizations lend NGO's their best possible help.

e) To create specialized courses on the prevention and tackling of environmental problems by fostering -- among workers -- an awareness of environmentally sustainable management.

f) To make sure that the technologies, equipments, tools and raw materials used are adjusted to the corresponding environmental requirements.

6. To establish support mechanisms for Scientific Research Institutions, with a view to establishing commitments with them so that they become fundamental props for NGO's. Towards this goal, it is essential:

a) To increase relationships with said institutions.

b) To request competent authorities to grant legitimate and fair budgetary support for the Scientific

Institutions.

- c) To forge agreements that direct investigations of verified environmental problems.

- 7. To combine actions with the Public Administration in order to jointly achieve:

- a) The diagnosis of environmental problems.
- b) A territorial regulation based on a timely process of consultations with the other interested parties.
- c) To work out plans and programs that respond to local conditions and needs.
- d) The analysis and evaluation of the environmental impact studies requested on all projects and works.
- e) The supervision and control of the actions of unfolding projects.
- f) The timely application of the respective legal regulations.

- 8. To request the creation and adequate functioning of the following social participation entities in order to guarantee compliance with the proposed activities and the achievement of planned objectives:

- a) Ecological Organizations in each Teaching Center, integrated by Students, Teachers, and other members of the Academic Community.
- b) The City Environmental Junta, Autonomous and Independent, integrated by people with a proven service vocation and a voluntary disposition, apart from democratically elected representatives of existing local community organizations.
- c) The Regional Commission for Environmental Education, proportionally integrated by Representatives of the corresponding Public and Private Institutions in each Federal Entity (State or Province) that may have a say in environmental issues. Media and NGO's must play an important role in this Commission.
- d) The Council or National Institute for Environmental Education, which has a higher standing than the Regional Commission -- but with a similar structure. This Council will be in charge of planning, co-ordinating, applying and evaluating all domestic activities which are environment-education oriented. These activities must result from participative actions by all interested parties and must comply with the National Environmental Education Plan previously laid out. They must be supported by corresponding regional and local plans.
- e) Regional Centers integrated by the countries in an area as a function of their interests and characteristics.
- f) A world Entity for Environmental Education which integrates the countries in the world with existing accords or based on new decisions that must be taken with regard to this issue; to co-ordinate and evaluate internationally planned actions and create information and experience exchange networks in order to jointly face the most serious problems in the planet.

III. MEANS OF IMPLEMENTATION:

The funding for Local, Regional and National Entities in each country will be determined by the budgetary contributions of the corresponding governments and with international contributions eventually received.

At the international level, the financing of Regional bodies will be achieved through equitable contributions by accredited governments, by engaged Organizations in the United Nations Organization, and by other international contributions.

VIEWS

A green path from sea to sea

*Breathing nature in. Unplugging from TV.
Growing the world's longest park.*

Don E. McAllister
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A VISION

Autumn geese honking as they fly up from a northern river, a blue dragonfly buzzing lightly amongst the lake-side reeds, the many-colored tiny flowers of a mountain meadow, a green crablet scuttling in a pink coralline algae-lined Pacific tide pool, all these are sights, sounds and fragrances less and less familiar to Canadians. A Green Path network would help people return to and immerse in nature on weekends and on vacations, to experience deciduous and coniferous forests, grasslands, tundras, rivers and kelp glades.

In cities, many people are light years from nature, eyes or ears glued to TV sets, transistors, phones, our noses beset by canned office/schoolroom air and diesel fumes. Even on our holidays we are enclosed in glass and metal cars, or hauled by trail motorcycles, outboard engines, snowmobiles or ski tows. If we are to regain inner harmony and rhythms, find inspiration and realize the lofty goals of the Earth Summit, then we must regain contact with nature. R. Thomas Tanner (1992. Trumpeter, Fall, p. 177), is concerned about the future, "With more than three-quarters of American children being raised in urban-suburban environments, one must wonder from whence will come the next generation of those dedicated to protect the world of nature." We have even started talking about an electronic "virtual reality". **Nature** is the real world. A Green Path would guide us back to and make us feel part of the natural world. Such a Path would be safer than highways for those who bicycle.

The first Green Path could be relatively simple to get established. It could then grow like a tree over the years.

THE GREEN PATH IS...

In the country, the Green Path would be a network of paths in natural land- and waterscapes. The paths would be open for walking, jogging, bicycles, wheelchairs, kayaks and canoes in summer, spring and fall and cross country skis and snow shoes in winter. Horse trails could parallel some parts of the path. The Path would be a motor-free zone (except for emergencies). Outside the cities, the Green Path would let one sample the natural ecological zones of Canada, or those being restored. Where possible the Path park would be a kilometre or two wide, to enable one to fully immerse in nature, free from sounds and sights of development. The Path itself would be narrow to limit effects on vegetation and soil. Connecting protected areas, the Path could also serve as a corridor for plants and wildlife. Water paths on wild rivers, through lakes and coastal waters and archipelagos, would connect us to the water world and its life.

In the country, the Green Path would be supported by hostels and campgrounds, half a day's hiking apart. The hostels would be built out of local materials and feature cuisines characteristic of the region, from clam chowder, tourtières, maple syrup pancakes and cloud berries, to baked salmon. The hostels would be run as local self-supporting enterprises, rather than as chains, to support diversity over uniformity, and support local businesses and indigenous peoples. Hostels would also sell supplies for campers in recyclable form - supplies for cotton bags, rather than in throw-away cans and plastic containers.

Path users would be encouraged to leave their portable cassette/CD, transistors and TVs at home. This would encourage the **primary focus** on the experiencing nature's sounds, sights, fragrances and rhythms directly. Nature would be absorbed while walking peacefully, or contemplating her from rustic seats in solitude. Small museums, campfire talks and nature trails would teach about local biodiversity, ecosystems and ecological functions. A **secondary focus**, meeting Canadians of all walks of life, cultures and languages, would be encouraged at picnic facilities, placed to encourage small groups of people, rather than the typical isolated tables. Would English and French Canadians, indigenous and European peoples, Christians, Muslims and Jews, foreign tourists and Canadians, not understand one another better if they had actually met and talked with one another beside a campfire? The Path would therefore be a friendship trail as well as a nature trail. A **third focus** of the trail would be connectedness. It would symbolize, as Chief Seattle was reputed to say,

"The Earth does not belong to man; man belongs to the Earth. This we know. All things are connected like the blood which unites one family... Man did not weave the web of life; he is merely a strand in it. Whatever he does to the web, he does to himself."

In the cities, Green Paths would create green swathes, link parks, playgrounds, ponds, wetlands and rocky outcrops. It would join up with the countryside path system, enabling people to walk or ski out of the city as they do in Sweden. Subways would conduct roads and cars **under** the path system. This would permit people to walk to work or school, or to shops, retaking the cities from autos. A gradual redesigning of cities would change the radial downtown centre pattern to neighbourhoods where one could work, shop and learn, commuting on foot or bicycle. We currently spend billions on city freeways, interchanges, and parking areas. Why not spend one percent of this, or more, on a Green Path foot network, and green space nodes? The Green Path would be landscaped with **native** varieties of trees and wildflowers, adapted to the local climate, and providing habitat for native animals.

MAKING THE TRAIL

The Paths and any facilities would be constructed out of locally available materials. The trail and toilets would be designed so as not to impact the environment. Use of herbicides and pesticides would be forbidden. Periodic bus/car access roads to nodes on the Path and parking lots would be provided. Railway lines out of service, Indian trade trails, and historic pioneer roads could be used for part of the network. Existing paths like the West Coast Trail on Vancouver Island, Mackenzie's Route to the Sea, the Okanagan Highland's Trail (all of British Columbia), the Bruce and Rideau Trails (of Ontario) could be incorporated. The Path would be threaded through as many bioregions as possible. But endangered ecological zones and areas with endangered species would be excluded. In other areas the Path could be used as sites to reestablish natural areas degraded by farming, logging or industry, or as a small corridor between protected areas.

Segments of the Path network could be made and maintained by NGOs, indigenous peoples, bioregional groups, schools, clubs, forest and mining industries, university students, girl/boy guides/scouts, bicycle, ski, and snowshoe clubs, municipal, provincial and federal governments. Law associations could donate their services to obtain the trail's right of way. Provincial and National Parks agencies could assume responsibility for helping plan, coordinating and maintaining the Path network - the longest park in the world.

In the future, Canada's Green Path could link into a global network.

NAMING THE TRAILS

The main trunks of the path could be named after the First Peoples - their own names for themselves, whose lands they historically occupied. Branches could be named after ecological zones - Long Grass Prairie Trail, characteristic biota - Ponderosa Trail, voyageurs and explorers - Radisson, pioneers, etc.





USING THE TRAIL

A very few simple rules would make the trail more enjoyable. Users of the trail would be asked to leave no traces behind them, to protect land- and waterscapes, and all their life forms, to respect the diverse users of the Path, and to help maintain its cleanliness. Can-, foil- or plastic-free packaging would be encouraged for camping supplies - food would be packed in cotton bags, on the principle, "You take it in, you carry it out". Small musical instruments and singing would be permitted in camps before children's bedtime.

GOALS OF THE PATH

The goals of the Green Path would include:

- Coming into closer contact with nature
- Increasing awareness of the diversity and interconnectedness of life
- Helping diverse Canadians grok and walk together
- Promoting physical health through exercise and spiritual renewal
- Creating green corridors between protected areas
- Reducing pollution (human rather than engine power)
- Creating a symbol for the Earth Summit & connectedness of nature
- Getting us blimps out of cars, couch potatoes away from the TV, ubiquitous personal radio/cassette players unplugged, seeing, hearing and smelling nature, talking and singing in the real world



SUMMARY

The Green Path would be a nature and friendship trail across Canada to bring people into closer contact with nature and one another. It would be a way of finding our place in the natural universe, from which we are distanced by our mechanistic and materialistic life style. It would be a small project compared to the Trans-Canada Highway, James Bay II, transnational corporate ventures, "free" trade zones, or our growing digital electronic networks. Why not start growing the network, now, to celebrate and symbolize the Earth Summit?

[The author proposed the Green Path as a symbolic act in recognition of the Earth Summit's promise before Parliament's Standing Committee on the Environment in December 1992. I was pleased to read that Canada 125 wants to establish a foundation to build a trail across Canada (Ottawa Citizen, 31 December 1992, p. B1). Their feasibility study estimated that existing trails would reduce construction on the main trail by 20%. The cost was estimated at \$400 million, a very modest sum in terms of highway construction. Negotiations are to secure donations from the private sector are going on at the present moment.]

Canada was keeping ahead of the U.S. in regard to a national trail system when in April 1971, the Canadian national trail movement was born at a meeting of national associations in Toronto, attended by Ray Lowes. The difference has been that levels of U.S. government recognized the need for such a trail system and funded accordingly, whereas it took several years before the Canadian government even allowed funding for national meetings.

The N.T.A.C. has more than survived, with sections of trail designated in British Columbia, Alberta, Ontario, Québec, New Brunswick and Nova Scotia, with a generous section of the Bruce Trail already marked. The contribution made by the Bruce Trail Association, which was founded in 1960, has been significant as many of the lessons learned in the early years of the Bruce Trail were not only applied but provided inspiration and encouragement when trail building efforts seemed unrewarded. For more information contact L.D. Campbell, Secretary, Bruce Trail Association, Box 857, Hamilton, ON L8N 3N9, Canada; annual individual memberships are \$24, family \$27, and donations are appreciated; telephone (416) 529-6821. The National Trail Association of Canada can be reached via: James Selley, President, 581 Echo Drive, Ottawa, ON K1S 1N9, Canada, and by telephone at: (613) 789-3932; individual memberships are \$20, family \$30 per year; donations are appreciated.

The author gratefully acknowledges helpful comments on the manuscript by Lars Karstad and Frederick W. Schueler].

A basic biodiversity reference library

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A number of people have asked me for a recommended list of basic books and periodicals on biodiversity. Thinking that others too, would like such a list and that international funding agencies and NGOs typically neglect the need to build libraries in the South to provide knowledge and empowerment, or, in the North for their own education, I've committed a basic list to paper. Books are chosen for global-level focus; regional/national level books are not included unless they have global implications. I added thumbnail sketches on each book/periodical to help in choosing items, and enough citation detail so one should be able to order the books from a bookstore or other source. The approximate prices are noted in Canadian or U.S. dollars.

This is very much a selected list for a **basic** library, not by any means an attempt to be exhaustive - book budgets, personal and institutional, especially in the South, are limited. I would appreciate suggestions for **key** works to be added. Publications devoted to the biodiversity of individual taxonomic groups, such as birds or fungi, were excluded; that would be too voluminous.

Books are listed alphabetically by author(s).

BOOKS

Adams, Patricia. 1991. **Odious debts. Loose lending, corruption, and the Third World's environmental legacy.** Earthscan, London, Toronto. 252 pp. Paperback, ISBN 1-85383-122-0. Earthscan Canada, 225 Brunswick Avenue, Toronto, Ontario M5S 2M6, Canada, telephone (416) 978-7014, fax: (416) 978-3824. *Billions of dollars in loans have been provided by the World Bank and other international and private banks and by national governments, for environmental and development - often anti-environmental projects. This book tells about the fate of the Third World's growing debt, the impacts of debt and restructuring policies, the role of corruption and military in wastage of monies lent, etc. There are many lessons to be learned from this book before the Global Environment Facility of the World Bank (or its alternative) are funded for Earth Summit goals.*

Austin, B. 1988. **Marine microbiology.** Cambridge University Press, The Pitt Building, Trumpington Street, Cambridge CB2 1RP, UK. 222 pp. Paperback, ISBN 0-521-31130-6, Canadian \$28.95. *Conservationists, NGOs and governments tend to ignore microorganisms. Yet marine bacteria help provide the planet's oxygen and feed the fishes. Terrestrial bacteria recycle nutrients. This book tells about microbiological methods, sampling microbial populations, taxonomy, ecology, biology, deep sea microbiology, benefits of bacteria and biotechnology. It is a text able to help one appreciate the micro-living world, and stretch our minds on the breadth of biodiversity.*

Carson, Rachel. 1987. **Silent spring**. Twenty-fifth anniversary edition. Houghton Mifflin, 1 Beacon Lane, Boston, MA 02108, U.S.A. 448 pp. Hardcover ISBN 0-395-45387-5, US\$19.95; paper ISBN 0-395-45390-9, \$8.70. *This classic book, written 30 years ago, introduced the public to the widespread dangers of pesticides. Well-researched, it withstood the attempts of the pesticide industry to discredit the author.*

Erlich, Paul R. and Erlich, Anne H. 1990. **The population explosion**. A Touchstone Book, Simon & Schuster Inc, New York, London, Toronto, Sydney, Tokyo and Singapore. 320 pp. Paperback, ISBN 0-671-68984-3, Canadian \$13.95. *The Biodiversity Convention failed to substantively address the issue of human population growth. Yet population growth (P), affluence (A, resource use) and technology (T) are the root impacts (I) on biodiversity loss - $I = P \times A \times T$. Deforestation, pollution, grassland disappearance, degradation of coral reefs, species loss, and many others are directly related to PAT. Remedies for environment and poverty will not work unless these fundamental issues are addressed. Parks, food supplies, and development funds will be eaten up through population growth, unless these issues are addressed. The Erlichs have written a clear-sighted analysis of the population explosion. The Erlichs are well-known ecologists who have worked on population problems in the past.*

Groombridge, Brian (Editor). 1992. **Global biodiversity. Status of the Earth's living resources**. A report compiled by the World Conservation Monitoring Centre. Chapman & Hall, 2-6 Boundary Row, London SE1 8HN, U.K., also Glasgow, New York, Tokyo, Melbourne, Madras. 594 pp. + illus. Hardcover, ISBN 0-412-47240-6, \$59.95. *This book covers systematics and diversity (weakly covered by other books), species diversity, species loss, habitats and ecosystem, uses and values of biodiversity, conservation and management of biodiversity. It is replete with tables, lists, maps and graphs; there is a glossary but no index. Amongst this book's strong points is a section on soil fauna (ignored by most books), discussion of fish biodiversity (ignored by many books), a list of extinct animals and plants, tables on and a map of coral reefs, a table of multilateral treaties and who has signed them, material on in situ conservation of crops. This book is most valuable for its high information content, much not available in other biodiversity books.*

Hammond, Herb. 1991. **Seeing the forest among the trees. The case for wholistic forest use**. Polestar Press Ltd., Vancouver, B.C., Canada. 309 pp., illus. Softcover, ISBN 0-919591-58-2, Canadian \$46.95. Distributed by: Raincoast Book Distribution Ltd., 112 East 3rd Avenue, Vancouver, B.C. V5T 1C8, Canada, telephone (604) 873-6581. *This book, replete with information, tells about the environmental, economic and social impacts of current forest management under multinationals and replanting practices and it presents practical solutions for ecologically sustainable forest management - selective low-impact logging, natural regeneration, community-orientation, etc. The messages are conveyed in text backed up by splendid photos. Although the approach is rooted in the forests of British Columbia, the basic interconnectedness of forest ecosystems, approaches to tree removal and use, reducing soil erosion, tree regeneration, etc. are applicable to forests around the world. A version of the book is being prepared for children.*

Harrison, Paul. 1992. **The Third Revolution. Environment, population and a sustainable world**. I.B. Tauris & Co. Ltd., 110 Gloucester Avenue, London NW1 8JA, U.K. & New York. 359 pp. Hardcover, ISBN 1-85043-501-4, Canadian \$33.99. *This book effectively and lucidly addresses the issues of environment, population and sustainability. One of its merits is that it brings you down to the ground. The author has visited many communities and environments in the tropics and provides first-hand knowledge of what poverty means, impacts of large families, and why forests are being cut. It's packed with information.*

Hawksworth, D.L. (Editor). 1991. **The biodiversity of microorganisms and invertebrates: Its role in sustainable agriculture.** Proceedings of the First Workshop on the Ecological Foundations of Sustainable Agriculture (WEFSA 1), London, 26-27 July 1990. C.A.B. International, Wallingford, Oxon OX10 8DE, U.K., telephone (0491) 32111, fax (0491) 33508. 302 pp., illus. Hardcover, ISBN 0-85198-722-2, UK£40. *Modern agriculture has focused on chemical fertilizers and pesticides, ignoring the living and organic functions of soil. This book discusses the role of soil invertebrates and microorganisms in ensuring healthy soil, transporting nutrients to plant roots, recycling nutrients, pest control. Ecological management of soils provides options for reducing tillage, input of fertilizer and toxic chemicals, as well as reduced output of chemicals into ground and surface waters.*

Hillel, Daniel J. 1991. **Out of the earth, civilization and the life of the soil.** The Free Press, A division of Macmillan, Inc., New York, Collier Macmillan Canada, Toronto. 321 pp. Hardcover, ISBN 0-02-915060-4, Canadian \$31.50. *The soil ecosystems and biodiversity were given low priority in the Biodiversity Convention. Yet soil sustains grasslands, tundras, scrubland, forests and our croplands. This book provides, in very readable form, a basic understanding of soils, lessons from history on what happened to civilizations that neglect their soils, and case histories of current problems in soil conservation from countries around the world. Read about the forgotten world under our feet.*

IUCN, UNEP and WWF. 1991. **Caring for the Earth. A strategy for sustainable living.** The World Conservation Union, United Nations Environment Programme, and World Wide Fund for Nature. Gland, Switzerland. 228 pp., illus. Paperback, ISBN English: 2-8317-0074-4; French 2-8317-0075-2 [**Sauver la planète. Stratégie pour l'avenir de la vie, 250 pp.**]; Spanish 2-8317-0076-0; Earthscan edition 1-85383-126-3. *This book provides principles for sustainable living, additional actions for sustainability, and implementation and follow-up of the strategy. Eight annexes provide a mine of information comparing countries, estimating plant production affected by humans, etc. It lacks an index. Though sparsely illustrated, numerous boxes emphasize key information. The text, consisting of a series of numbered actions, is focused on conservation activities.*

Johannes, R.E. 1981. **Words of the lagoon. Fishing and marine lore in the Palau District of Micronesia.** University of California Press, Berkeley, California, U.S.A. 94720; Los Angeles and London. 245 pp. Hardcover, ISBN 0-520-03929-7. *The knowledge of indigenous peoples has accumulated and evolved through millennia of accumulated practical experience and insightful thinking. It complements the knowledge of science obtained over a shorter period of time. Words of the lagoon is the pioneering account of a marine biologist to discover, test and record the knowledge possessed by native fisher people in the Palau Islands in the South Pacific. They possess substantive knowledge unknown by scientists about coral reef life and oceanography. It provides fascinating reading.*

Koopowitz, Harold and Kaye, Hilary. 1986. **Plant extinction: A global crisis.** Stone Wall Press, Inc., 1241 30th Street, N.W., Washington, D.C., U.S.A. 20007. 239 pp., illus. Hardcover, ISBN 0-913276-44-8, Canadian \$27.95. *This book documents the loss of the Earth's plants and the resultant threat, keys to the values of plants, describes plant politics and how to create your own seed bank, and illustrates plant loss with global case studies and plant examples.*

Leopold, Aldo. 1949. **A Sand County almanac, and sketches here and there.** Ballantine Books, New York. Paper, ISBN 0-19-500777, US\$8.95. *This classic book looks at a landscape to see how it connects with its geological past and recent human history. Encourages thinking interpretively about landscape, how it got where it is, and where it is going.*

Margulis, Lynn. 1988. **Five kingdoms, an illustrated guide to the phyla of life on Earth.** W.H. Freeman and Company, New York. Second edition. 376 pp., illus. Paperback, ISBN 0-7167-1912-6. *This book provides a guide to all the phyla in the five kingdoms of life forms on Earth (knowledge has advanced beyond the simple two kingdoms of plants and animals). The distinguishing features and biology of each phyla are described. There is a photo and drawing showing the appearance and anatomy of each phylum, plus a habitat drawing showing where the phylum commonly occurs. The text, though somewhat popularized is on the technical side so a course(es) in biology would help one read this book; however there is a glossary. This book is most valuable in that it helps the environmentalist, conservationist, learn about and reach beyond the limited wildlife definition of biodiversity. And it helps appreciate the importance of diverse life forms in the ecological services that they carry out. All life forms other than viruses are included. It has an index.*

Maxwell, Nicole. 1990. **Witch doctor's apprentice. Hunting for medicinal plants in the Amazon.** Library of the Mystic Arts, Citadel Press, A Division of Carol Publishing Group, 600 Madison Avenue, New York, N.Y. 10022, U.S.A. Third edition. 391 pp., photos. Paperback, ISBN 0-8065-1174-5, US\$12.95. *This narrative provides insights into indigenous peoples knowledge of medicinal plants and into the attitudes and goals of the pharmaceutical industry. It is a good read as well as informative.*

McNeely, Jeffrey A., Miller, Kenton, R., Reid, Walter V., Mittermeier, Russell A. and Werner, Timothy B. 1990. **Conserving the world's biological diversity.** International Union for Conservation of Nature and Natural Resources, World Resources Institute, Conservation International, World Wildlife Fund-US and the World Bank, Washington, D.C. 193 pp., illus. Paperback, ISBN 0-915825-42-2. Obtainable from: IUCN Publication Services, 1196 Gland, Switzerland; WRI Publications, P.O. Box 4852, Hamden Station, Baltimore, MD, U.S.A. 21211; World Bank Publications, P.O. Box 7247-8619, Philadelphia, PA, U.S.A. 19170-8619. *This book treats the nature and value of biological diversity, its threats, conservation approaches, information needed, priorities to be established and the role of strategies and action plans. Its main focus is on conservation. Boxes of key information and illustrations help carry the message. There is an index.*

Miller, Kenton and Tangle, Laura. 1991. **Trees of life: Saving tropical forests and their biological wealth.** Beacon Press, Boston. 218 pp., illus. Hardcover, ISBN 0-8070-8508-1, US\$27.50, paper ISBN 0-8070-8505-7, \$9.95. *A good introduction, not too technical, emotive.*

Myers, Norman. 1992. **The primary source. Tropical forests and our future.** W.W. Norton, New York. 448 pp., illus. Paperback, ISBN 0-393-30828, US\$10.95.

Norse, Elliot A. 1993. **Global Marine biological diversity. Strategy and for building conservation into decision making.** Going to press, Island Press, Washington, D.C. Center for Marine Conservation, 1725 DeSales NW, Suite 500, Washington, DC, U.S.A. 20036, telephone (202) 429-5609. *This report tells about the importance of marine biodiversity (forgotten in many conservation programs), the distinctiveness of marine compared to terrestrial conservation, threats and dilemmas, goals, strategies and tools of marine conservation, and about existing marine institutions and instruments. Marine biodiversity occupies two-thirds of the globe; it is too important to forget.*

Ofosu-Amaah, Waafas and Philleo, Wendy (Editors). 1992. **Success stories of women and the environment.** Volume II. Proceedings of the Global Assembly of Women and the Environment, "Partners in Life." WorldWIDE Network, Inc., 1331 H Street, NW, Suite 903, Washington, D.C., U.S.A. 20005,

telephone (202) 347-1514, fax: 347-1524. 296 pp. *This volume provides a number of valuable services: it provides lanterns of hope, amidst the global environmental gloom; it shows the important role that women play in environmental issues; it gives practical examples of projects; it shows that small groups can help change the world. The text consists of 218 success stories chosen from about 1000 responses on the basis of being affordable, visible, sustainable and repeatable. Contact persons and addresses for each project are provided along with a short problem and solution description, and a one-page description of the project. It is an uplifting book.*

Oldfield, Margery L. and Alcorn, Janis B. (Editors). 1991. **Biodiversity, culture, conservation and ecodevelopment.** Westview Press, Boulder, San Francisco, Oxford (5500 Central Avenue, Boulder, Colorado, U.S.A. 80301-2847). 349 pp. Paperback, ISBN 0-8133-7680-7, CAN\$41.95. *This volume emphasizes the urgent need for dialogue and cooperation between those who plan the future of biodiversity from afar in government and science, and the culturally diverse rural people who know what it means to live with biodiversity for the long term. Cultural and biological diversity are linked in agricultural ecosystems, in traditional conservation and use, and in biodiversity conservation and ecodevelopment. An epilogue discusses ethics, economics and conservation.*

Robinson, Gordon. 1988. **The forest and the trees. A guide to excellent forestry.** Island Press, Suite 300, 1718 Connecticut Avenue, N.W., Washington, D.C., U.S.A. 20009. 257 pp. Paperback, ISBN 0-933280-40-8, Canadian \$26.95. *This book outlines a history of forestry in the U.S., the science and philosophy of multiple use, forest planing, and provides materials for helping change the forest management system, e.g. how to check sustained yield or allowable cut. The author, who has sustainably managed forests, gives practical advice.*

Rowe, Stan. 1990. **Home place. Essays in ecology.** NeWest, Suite 310, 10359 - 82 Avenue, Edmonton, Alberta T6E 1Z9, Canada. 253 pp. Paperback, ISBN 0-920897-78-9, Canadian \$14.95. *This book presents an awareness and appreciation of wholeness. It focuses on the Ecosphere, the world comprised of the atmosphere, aquasphere, lithosphere and the life contained therein. The Earth gave birth to life and that life gave birth to the Earth as we know it today. The perception of the ecosphere is transmitted through philosophy and textual images of prairies and forests. The writing is elegant, concise, lucid and a pleasure to read, written by a forest ecologist who has thought deeply for years on the interconnectedness, ethics and esthetics of the Ecosphere.*

Salvat, Bernard. 1987. **Human impacts on coral reefs: Facts and recommendations. Impacts des activités humaines sur les récifs coralliens: Connaissances et recommandations.** Ecole Pratique des Hautes Etudes, Laboratoire de Biologie Marine et de Malacologie, 55, rue Buffon, 75231 Paris Cedex 05, France. 253 pp. Paperback, ISBN 2-905630-06-X. *Coral reefs are the most biodiverse ecosystem in the oceans and are enduring serious stresses and losses due to human activity. This book describes the stresses and makes recommendations on fish, shell and coral collecting, overfishing, dynamiting and other destructive fishing methods, sewage and oil pollution, nuclear weapon testing, dredging, recreation, exotic species, crown-of-thorns starfish outbreaks and ciguatera fish poisoning. French summaries are provided for each paper.*

Scagel, R.E., Bandoni, R.J., Maze, J.R., Rouse, G.E., Schofield, W.B. and Stein, J.R. 1984. **Plants, an evolutionary survey.** Wadsworth Publishing Company, Belmont, California. 757 pp. Hardcover, ISBN 0-534-02802-0, Can\$76.45. *This book surveys the major groups of "plants" (plants are still considered one kingdom) from the bacteria and bluegreen algae up to the vascular plants. The text deals with*

characteristics, structure, reproduction, relationships and evolution of the different groups. The writing is appropriate for someone with botanical background, though there is an excellent glossary. Many illustrations and an index make the book more useful.

Suzuki, David and Knudtson, Peter. 1990. **Genethics: The ethics of engineering life.** Stoddart Publishing Company Ltd., 34 Lesmill Road, Toronto, Ontario M3B 2T6, Canada. 372 pp., illus. Paper, ISBN 0-7737-5421-0, Can\$16.95. *Written by a world renowned geneticist and a science writer, this book discusses genetics, the science of heredity, and the implications of genetic engineering, oversimplification of connections between human behavior, such as crime, and genes, genetic screening for the workplace, healing diseases with gene therapy, biological weapons, and the breeding of new varieties/preservation of natural genetic diversity. Each chapter is headed by a Genetic Principle, e.g. Genetic diversity, in both human and nonhuman species, is a precious planetary resource, and it is in our best interests to monitor and preserve that biodiversity. A glossary, chapter reference list, and index increase usefulness of this book.*

UNEP/IUCN. 1988. **Coral reefs of the world.** Hardcover: Volume 1, Atlantic and Eastern Pacific, 373 pp., ISBN 2-88032-943-4; Volume 2, Indian Ocean, Red Sea and Gulf, 389 pp., ISBN 2-88032-943-4; Volume 3, Central and western Pacific, 329 pp., ISBN 2-88032-945-0. UNEP Regional Seas Directories and Bibliographies; IUCN, Gland, Switzerland and Cambridge. U.K./UNEP, Nairobi, Kenya. Hardcover, US \$100 for the set of 3 volumes, or \$45 each. Available from IUCN Publication Services, 219c Huntingdon Road, Cambridge WC2E 9DS, U.K. *These volumes cover the coral reefs of the world, listed alphabetically under country within the three regional volumes. Each country section has an introduction with a general description of coral reefs and often a map, reef resources, disturbances and deficiencies, recommendations, and references. The second section describes those reefs that have been protected or are proposed for protection. These volumes are a superb reference on the status of the world's coral reefs, a goldmine of information and an excellent starting point for examining the coral reefs of any country.*

Wilson, Edward O. 1988. **Biodiversity.** National Academy Press, Washington, D.C. 521 pp., illus. Paperback, ISBN 0-309-03739-5. Obtainable from: National Academy of Sciences, 2101 Constitution Avenue, N.W., Washington, D.C., U.S.A. 20077-5576. *This book is the result of the National Forum on Biodiversity, held in Washington, D.C., September 22-24, 1986 by the National Academy of Sciences and the Smithsonian Institution. It has 57 chapters which tell about conservation challenges, worth to humanity, threats to diversity, monitoring and protection, contribution of science, technology and restoration ecology, policies, alternatives, problems and prospects. It concludes with different views of biodiversity and an index. The chapters are much more readable and in depth than most symposia. It's a readable source book. Its nine printings bespeak its popularity.*

Wilson, Edward O. 1992. **The diversity of life.** The Belknap Press of Harvard University Press, Cambridge, Massachusetts, U.S.A. 424 pp., illus. Hardcover, ISBN 0-674-21298. Canadian\$40.00. *This is a book meant to be read, rather than just a reference. It encompasses much scientific knowledge, written by one of the experts, in very clear language, embellished with scenes from rainforests, volcanic eruptions, etc. Basically it is a book that tells you what biodiversity is, how many species there are, how it evolved, how rapidly it is being lost, and what are the principal solutions to avert further loss. It has a good index.*

WRI, IUCN and UNEP. 1992. **Global biodiversity strategy. Guidelines for action to save, study, and use Earth's biotic wealth sustainably and equitably.** World Resources Institute, The World Conservation Union (IUCN), and United Nations Environment Programme in consultation with Food and Agricultural Organization and UNESCO. 244 pp., illus. Paperback, ISBN 0-915825-74-0. \$19.95 + \$3 for shipping from: WRI Publications, P.O. Box 4852, Hampden Station, Baltimore, Maryland, U.S.A. 21211. *This book documents 85 strategies for needed research, conservation and wise use of the Earth's biodiversity. Written with input*

through 6 consultations, 6 workshops and 500 individuals around the world, it provides a wise plan for saving Earth and its life. Basically it is a what to do book. Maps, illustrations, graphs, text boxes and examples help communicate the messages. It has an index.

PERIODICALS

Biological Conservation Newsletter. Published by Smithsonian Institution, Department of Botany, National Museum of Natural History, Washington, D.C. *This monthly newsletter, usually 4 pages long, is invaluable because it gives a listing of current conservation articles. As well it features short articles on institutions, activities and meetings.*

Canadian Biodiversity / Bulletin canadien de la biodiversité. A quarterly bulletin published by: Canadian Centre for Biodiversity, Canadian Museum of Nature, P.O. Box 3443, Station D, Ottawa, Ontario K1P 6P4. ISSN 1183-3254 (English), 1183-3378 (French). Fax: (613) 990-8818. Subscription rates Canadian \$25 for individuals & \$50 for libraries/institutions in Canada (including GST); US \$25 & \$50 in other developed countries; and Canadian \$10 & \$15 in lesser developed countries. *An international forum on biodiversity published in English and French editions. Publishes articles, views and news on biodiversity research, conservation and ecologically sustainable uses.*

Conservation Biology. A quarterly journal published by the Society for Conservation Biology. The journal is included without extra charge to members, for institutions/libraries the subscription rate is US\$122.00 and are obtainable by writing Blackwell Scientific Publications, Osney Mead, Oxford OX2 0EL, UK. *The journal exchanges ideas and information on population biology, ecosystem ecology, climatic change, landscape ecology, wildlife and preserve management, philosophy of conservation, conservation law, and others. It includes the Diversity column, International Conservation News, features articles, book reviews, News of the Society, Conservation Education, and special sections on single topics such as edge effects.*

Diversity. A news journal for the International Plant Genetic Resources Community. ISSN 0744-8163. Published quarterly by: GRCS, Inc., 727 8th Street, SE, Washington, D.C. 20003, U.S.A. Fax: (202): 544-2521. Subscription rates for governments/non-profit institutions and individuals: US\$35 in North America & \$50 outside; all others in North America \$55 & \$70 outside of North America. *This journal provides world, Washington, NPGS Network news, viewpoint articles and lists of publications and events.*

Species. Newsletter of the Species Survival Commission, IUCN - The World Conservation Union. ISSN 1016-927X. Two issues per year obtainable from: Species Survival Commission, c/o Chicago Zoological Society, Brookfield, Illinois 60513, U.S.A. Subscriptions: U.S. \$18, £10.00 or SF 25.00. *This newsletter reports on the activities of the many Specialist Groups of the Species Survival Commission of the IUCN - The World Conservation Union. Species also provides general news, feature articles and book reports.*

Trumpeter. Journal of ecosophy. LightStar Press, The Trumpeter, P.O. Box 5853, Station B, Victoria, B.C. V8R 6S8. ISSN 0832-6193. Published quarterly. Subscription rates are Can\$20 in Canada, US\$20 in U.S. and overseas, \$40 to institutions. *This quarterly provides a diversity of perspectives on environmental relationships and Nature, including cross- and transdisciplinary reflections from scholarly and non-scholarly sources. It aims to investigate deep ecological philosophy as it manifests itself in the activities and lives of people working in different ways to come to a deeper and more harmonious relationship between self, community and Nature.*

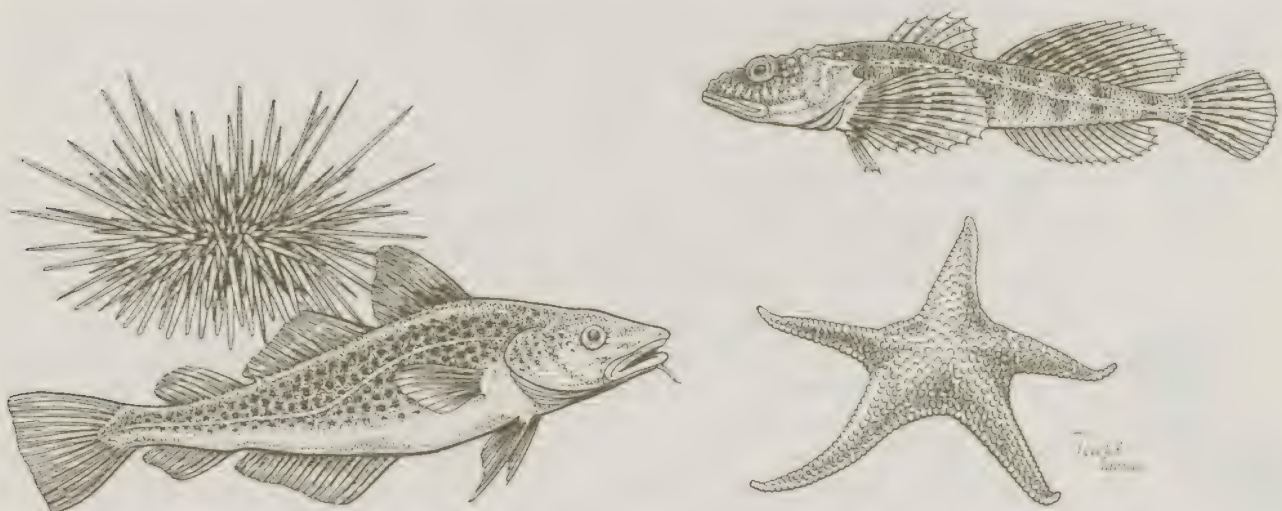
Biodiversity distinguished from Biological Resources

The press and renewable resource-oriented organizations often use the words **biodiversity** and **biological resources** interchangeably. But there are very important differences between the two. **Biodiversity** means the diversity of [all of] life on Earth, or on some portion of Earth, including hereditary-, species- and ecological-kinds of diversity, or of some taxonomic group (for further discussion and definitions of biodiversity see McAllister 1991). **Biological resources**, on the other hand, means those populations or stocks of certain species that can be drawn upon to supply a human want. Biological resources are usually harvested or tapped to supply human wants such as food, shelter, and fuel. Products from such resources are either sold commercially or are used for subsistence. Probably less than 5% of Canada's animal, plant and microorganism biodiversity, represent or provide biological resources. A growing number of people believe that other species have an intrinsic right to survive and respect, regardless of its worth to humankind. The World Charter for Nature and the UNCED Convention on Biological Diversity recognize those intrinsic values. And a growing number of people and nations recognize that biological resources should be developed or used in a sustainable fashion, or even an ecologically sustainable fashion.

The diversity of species in given region greatly exceeds the number of resource species drawn upon for human wants. There are over 1100 species of fishes in the marine, brackish and fresh waters of Canada. But less than 200 of those species are commonly sought for commercial or recreational fisheries. Of the 134 native species of trees in Canada, fewer than 60 have significant commercial use. Then there are groups of organisms, such as jellyfishes and viruses which have few or no commercial uses in Canada.

Biological resources are usually construed in a narrow commercial sense. Biological diversity underlies the ecological functions or services which sustain the Earth's ecosphere and humankind. Ecological services include oxygen production, moderating soil erosion and water flow, banking carbon dioxide and otherwise moderating global and local climates. Not classified as biological resources, the value of these services is, nevertheless, very great. They do have enormous indirect economic value, and they do create the conditions needed for the survival of all life on Earth.

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Green Industry Corner

From time to time in this column, Canadian Biodiversity will recognize environmentally friendly products/firms that we have noticed or have had drawn to our attention by alert readers.



Lead-free fishing weights

The public has long been aware of the environmental consequences of lead pellets used in shotgun shells, particularly pellet accumulation in wetlands and ingestion by waterfowl. The use of lead shot for duck hunting in the United States is now banned. However, there is little awareness of the effects of the loss of lead sinkers and weights used on recreational fishing lines and commercial fishing gear. Yet sinkers and weights are frequently lost by anglers and commercial fishers, especially when the gear becomes caught on the bottom. There were 88,000 registered commercial fishers in Canada in 1986 and there are estimated to be 5.6 million recreational anglers in Canada. If commercial fishers average 1 kg loss per year and recreational anglers 50 grams, then this would mean a loss of 368,000 kg or 368 metric tonnes of lead in the Canadian freshwater and marine environments each year. If each licensed angler in Ontario lost one ounce of lead per year, this would represent the annual addition of 62 tons of lead in Ontario lakes and streams. Lead is one of the more toxic of metals and particularly affects the nervous system.



Lead may be harmful through two pathways, direct ingestion and absorption through the food chain or from water. Ducks, geese and loons commonly ingest gravel from the bottom to assist digestion. If, for example, even one lead shot sinker is swallowed, the loon will probably die within 4 to 21 days. One study in the U.S. showed that about half of the adult loon mortality was due to ingestion of lead fishing sinkers. The lead may be passed on to a predator that consumes a lead-sick water bird. Lead dissolves very slowly into the water, but dissolution will be more rapid in waters whose pH is lowered by acid precipitation, common in eastern Canada. Lead is soluble in dilute nitric acid but only slightly in sulphuric acid - the two chief components of acid rain. Thus lead may be absorbed from the water and passed up the food chain.



Becoming aware of the environmental harm that lead sinkers were causing, Edward Paterson and Larry Kissau decided to develop an environmentally friendly alternative fishing sinker and to market it under a newly established firm, **Bi Logic Tackle Company**. Research convinced them that bismuth, a white metal with a reddish tinge, was a suitable alternative. Bismuth lacks the toxic properties of lead but has a fairly high density (86.4% of that of lead). Bi Logic now manufactures 6 kinds of sinkers in a variety of weights.



To verify their claim of low toxicity for bismuth, I checked in **Black's Medical Dictionary** (1967 edition by William A.R. Thomson, M.D.) and the **Encyclopedia Britannica**. These sources stated that bismuth is a metal, of which the hydroxide, carbonate, subnitrate, salicylate, and oxychloride are used in medicine, apparently acting

by their protective, as well as slightly astringent and antiseptic properties. These compounds sooth the stomach or bowels when diarrhea or vomiting occurs, during ulcerative colitus attacks. It can be used to help check the diarrhea in doses of about 20 grains (1.2 g), though they may turn the stools black! Externally as a dusting powder, they are used as a cosmetic and to treat eczema and other moist conditions of the skin (commonly mixed in equal portions with starch or zinc oxide, or both). Joe Graedon (1980. *The people's pharmacy - 2*. Avon, New York) was quite laudatory about Pepto-Bismol, which contains bismuth subsalicylate, for treating "turista" (although critical in his evaluation of many medicines). A controlled experiment showed that this medication successfully treated student's diarrhea in Mexico with no overt side effects. Daily dosages (4 tablespoons or 2 ounces) for three weeks were administered. Pepto-Bismol is widely sold as an antacid. Bismuth is also used as an x-ray diagnostic tool; swallowed, it is opaque to x-rays and so helps outline the gastro-intestinal tract. It has also been used, by injection into muscles, to treat syphilis. Some reported toxic affects of bismuth were due to contamination with arsenic, or to nitrite poisoning, sometimes following large intake of bismuthyl nitrate. However, bismuth poisoning can occur as a result of absorption of bismuth compounds from open wounds or following injection; effects disappear rapidly when administration is stopped. Chronic exposure to bismuth, like many otherwise harmless substances, produces undesirable symptoms; bismuthosis, poisoning from continuous exposure to bismuth, may result in skin rashes and in degeneration of the liver and kidneys (*Academic Press Dictionary of Science and Technology*, 1992, p. 266).



This literature review, though not in depth, suggests that the toxicity of bismuth is generally lower than lead, and is beneficial for treating some health problems, externally and internally. References showed that bismuth is not soluble in hydrochloric acid, while lead is slightly so (solubility increasing with temperature); hydrochloric acid is the acid found in stomachs of vertebrates - 2 parts per 1000 in humans. That suggests that bismuth would be absorbed to a lesser degree than lead from the digestive.



Bismuth does have two disadvantages over lead. Firstly it has a lower density, 9.8, than lead whose density is 11.34. That density difference can be compensated for by casting slightly larger sinkers; as volume and weight increase by the cube, the difference in diameter need only be small. The other difference is in cost, lead is cheaper. The slightly higher costs that the bismuth weights are being marketed for, against its environmental advantages, appear to make it a modest but good investment (sinkers are much cheaper than lures). Bismuth does have one additional environmental plus, its melting point is lower, 271° C, compared to 327.5°C for lead. This means that less energy is expended in manufacturing weights from bismuth.



Altogether, the evidence suggests that bismuth makes much more environmentally friendly weights for recreational and commercial fishing gear than lead. Persons wishing to enquire about purchase of bismuth fishing weights can contact: Bi Logic Tackle Company, R.R. 3, Thessalon, Ontario P0R 1L0, Canada, telephone: (705) 841-2521 or 842-3367.



Don E. McAllister, Canadian Centre for Biodiversity, Canadian Museum of Nature, Ottawa, Canada.

BIOTECH CORNER

Breakthrough in alcohol-producing bacteria - the "alcorobe."

A model/lesson for eco-friendly harnessing of microorganisms.

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THE ALCOROBE, FUEL FROM WASTE

Lonnie Ingram, of the Institute of Food and Agricultural Sciences, University of Florida, Gainesville has developed a new strain of bacterium that can produce ethanol (grain alcohol), from almost any kind of plant material, including corn stocks or cobs, sawdust, grass clippings, old newspapers, or even paper mill sludge. This development has exciting economic and environmental potential, in itself and as a model for the potential of putting the biodiversity of microorganisms to work.

Ingram developed the new bacterium by transferring two genes from one strain of bacterium to another, a kind of hybrid microbe he calls, "superbug." I suggest the name "alcorobe," short for alcohol-producing microbe. Ingram inserted genes (from *Zymomonas mobilis*) for alcohol dehydrogenase and pyruvate decarboxylase into *Escherichia coli* and *Klebsiella oxytoca* (*Integrated Waste Management*, October 14, 1992, p. 5). [*Escherichia coli* is the normally harmless bacterium that inhabits the human large intestine]. This enables one of the modified bacteria to break down cellulose into fermentable sugars and turn them into ethanol. The appetite of the alcorobe makes it possible to convert wastes into a viable product. The University of Florida was awarded U.S. Patent No. 5,000,000 for the new bacterial strain in March 1991. Ingram's associates believe the alcorobe will make it possible to distil a pure ethanol from a waste materials for as little as 45 to 50 cents per gallon (= 12 to 13 cents per litre) [*Ottawa Citizen*, January 3, 1993, p. C11]. A plant using the alcorobe will produce alcohol commercially in New York, opening in early 1994. Production of 10 million gallons of ethanol using sludge from 15 upstate paper mills, is planned. A major oil company will market the ethanol in gasoline blends in the Northeast (*New Fuels Report*, November 1992). It was pointed out that using waste instead of feedstocks to produce the alcohol would reduce the cost of production. Additionally this approach would reduce the rate at which landfill sites, increasingly expensive (up to \$60/ton), are filled up. Corn stover (the stalks, cobs and other corn waste, minus the kernels), peanut shells, waste newspaper and other substances could also serve as a suitable substrate. A group of Canadian



companies was earlier reported to be studying a plan to convert paperboard waste into ethanol (*Pulp and Paper Week*, June 22, p. 6).

Alcohol already has extensive use (5 billion gallons a year) as a fuel for automobiles in Brazil (to avoid foreign exchange problems with importation of gas). Alcohol has two important properties lacking in gasoline. Firstly it is a renewable resource. Secondly, the byproducts of its combustion are carbon dioxide and environmentally-friendly water. Ordinary gasoline, on the other hand, produces smog, nitrogen oxides, carbon monoxide, and other pollutants, as well as carbon dioxide. The use of alcohol has been limited in countries other than Brazil, because of its high price. The alcorobe offers the promise of a lower priced alcohol car fuel.

If the price of alcohol is lowered sufficiently, car manufacturers might adapt existing technology so alcohol can supplement or even replace the use of gasoline. Switching to alcohol would mean cleaner air, a decrease in lung-related health problems, a reduction in acid rain and its consequences.

There may be economic implications also. Countries, including some developing nations, with small petroleum reserves and sufficient waste materials convertible to alcohol, could find themselves with a more favorable balance of payments. Petroleum-rich countries might find their exports reduced, be obliged to lower petroleum prices to compete with alcohol, or find alternate markets for petroleum. The consumers may benefit from these lower prices.

There could be longterm down-sides. If the price of car fuel is lowered greatly, then it may encourage an increase in the volume of fuel used. Though cleaner than gasoline, the burning of alcohol still does produce carbon dioxide, a greenhouse gas that promotes climatic warming. A greatly increased use of alcohol could also contribute moderately to direct local warming from combustion; many cities already have warmer microclimates than the surrounding countryside due to the burning of fossil fuels. Warming impacts are not restricted to cheap alcohol; abundant low-cost fusion energy could have similar impacts. Transfer of alcohol-producing genes to *Escherichia coli* and infection of humans with this particular strain alcorobe, might have consequences for human health and safety; alcohol could be produced from cellulose in the human intestine and absorbed into the body. There are enough intoxicated drivers on the road!

OTHER GRISTS AND OTHER MILLS - PUTTING THE POTENTIAL OF MICROORGANISMS TO ADDITIONAL USES

There are several lessons to be learned from the alcorobe. Firstly wastes, like weeds are only "plants" that one has not yet found a use for. What other wastes than those from paper mills are both plentiful and, as presently disposed of, harmful or costly? Secondly, what other microorganisms, bacteria, fungi, etc., contain unique genes in their hereditary blueprints? Society might consider investing more in learning about the aquatic and terrestrial microorganisms that inhabit the planet from the tropics to the poles. Thirdly, impacts and safety when designing genetically modified organisms (GMO) should be taken into account, just as with any other development/invention. Fourthly, how does one prevent the loss of valuable microorganisms are being lost because of human activities in agriculture, forestry and pollution? Governments and environmental organizations have been concerned about loss of species of higher animals and plants; microorganisms are almost forgotten. Conservation activities could be broadened?

As an example of the first lesson, the reviewer would like to suggest that the necessary genes be identified and transferred to a bacterium that feeds on domestic wastes to produce alcohol - or some other valuable byproduct. Western society might start realizing that, despite its taboos, one of the great potentials of

sewage is as a resource. Sewage, in plentiful supply and near to manufacturing facilities, contains a great number of natural raw materials. What can we do with sawdust from lumber mills, milk wastes from cheese factories, gases and particles in smokestacks of factories and smelters, and many others? As an example of the second lesson, what other species of microorganisms have useful qualities in processing and what other genes have valuable attributes? Some chemical or industrial processes work optimally under extreme conditions, such as high temperature, acidity, salinity, pressures or the presence of a substance ordinarily toxic, e.g. either the waste medium is already at high temperatures or the chemical reaction will only take place under or will be most productive under at temperatures. Ordinary microbes would not work under those conditions. Microorganism experts or research may reveal microbiota with the required tolerance, into which the necessary genes could be inserted. For example Jørgensen, Isaksen and Jannasch have discovered bacteria in seawater from deepsea hotwater vents that were slightly higher than 110°C (1992. Bacterial sulfate reduction above 100°C in deep-sea hydrothermal vent sediments. *Science* 258: 1756-1757); most microorganisms are killed or inactive at such temperatures. At the other end of the scale, a number of Arctic and Antarctic marine organisms live in temperatures below the freezing point of freshwater - the freezing point of seawater is lowered because of the presence of dissolved salts. If a reader thinks that these suggestions are impractical pipedreams, remember that the brewing, baking, cheese and yogurt industries depend on microorganisms; beer alone is worth \$2.5 billion per year in Canada (Mosquin and Whiting. 1992. Canada Country Study of Biodiversity. Canadian Museum of Nature, Draft 1.1) and the billions of dollars spent world-wide on antibiotic medicines.

There has been general concern about the safety of GMOs (Suzuki, 1990. Genethics. Stoddart, Toronto. 373 pp.). The International Convention on Biological Diversity expressed its reservation in Article 19 "The Parties shall consider the need for and modalities of a protocol setting out appropriate procedures, including, in particular, advanced informed agreement, in the field of safe transfer, handling and use of any living modified organism resulting from biotechnology that may have adverse effect on the conservation and sustainable use of biological diversity." To a certain degree, the concern is unnecessary, many modified varieties of crops and selected strains of fungi for pharmaceutical purposes are harmless, indeed broadly beneficial. A rust-resistant variety of wheat is not something that has proven dangerous to humans or the environment. On the other hand, the potential of hybridization of domestic stocks with wild stocks, the geographic movement of exotic species (genetically modified or not), and the transfer of genes between widely differing taxonomic groups may pose, now and then, risks to the environment or to human health. There are also solutions to some of the problems. For example, above I posed the problem of alcorobes spreading to humans. If instead of transferring the alcohol-producing genes to the human intestinal bacterium, *Escherichia coli*, the genes were transferred to one of the deepsea hydrothermal vent bacteria adapted to very high temperatures, there would be little risk of this GMO spreading to humans or any ordinary terrestrial environments. This general principle could be applied to developing GMOs where the GMO posed potential risk to the environment or human health - use organisms adapted to a very restrictive unusual habitat.

Fourthly, the world of microorganisms is still being scientifically explored; thousands of species are unnamed or are ignored in conservation programmes (Hawksworth 1991. Fungi: A neglected component of biodiversity crucial to ecosystems function and maintenance. Canadian Biodiversity 1(4): 4-10). Fuhrman, McCallum and Davis (1992. *Nature* 356: 148-149) in their RNA analyses of marine bacteria, found one bacterium only distantly related to any organism - as distant as animals and plants. Thus remarkably different marine bacteria are still being discovered. It is probable that species of microorganisms are being lost, even before they are scientifically described. Agrochemicals are reducing the biodiversity of soil microorganisms and invertebrates (see book review on *Biodiversity of microorganisms and invertebrates: Its role in sustainable agriculture*). This information suggests that additional study and conservation of

microorganisms would be worthwhile. Colwell and Hawksworth (1991. *Microbial Diversity* 21, International Union of Biological Sciences and International Union of Microbial Societies) underlined the value of microorganisms, the lack of knowledge on, the need for study and conservation of microorganisms. The assistance of Drs. William Cruikshank and Dr. William Lowe in providing material for this article is gratefully acknowledged.

RÉSUMÉ

The alcorobe sends more important messages than cheap environmentally-friendly alcohol. Firstly, it tells us that biodiversity, be it genes, species or ecosystems, are significant sources of wealth, human and planetary health. Secondly it tells us that we should treat the soil and other ecosystems with respect for the life-support systems sustain. Soil and marine microorganisms are important for productivity in agriculture and fisheries, and contain millions of potentially useful genes for environmentally-friendly biotechnology. Thirdly, new biotechnologies should be subject to thoughtful review before release, yet not so constrained that the development of processes/products that would benefit the environment and humankind in the longterm, would be arrested. Fourthly, although biotechnology can alleviate human problems, such as harmful wastes, we should not let those boons hinder us from attacking the root environmental problems of human population growth and high per capita resource use. Fifthly, we are very ignorant about the smaller forms of life, including bacteria, their taxonomy, ecology and genetics. Most are not yet scientifically named, and the ecology and genetics of only a small fraction of the named species have been studied. At the same time, the number of ecologists, geneticists and taxonomists who explore these kinds of knowledge and life forms are decreasing. Nevertheless it is clear from present knowledge, that small is, at the same time, beautiful, life-sustaining to the planet, and can be valuable to humankind. To let live freely and to use a portion of biodiversity wisely and well, will be the key to the second millennium.

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NEWS

Biodiversity News Notes

Call for papers on: Indigenous knowledge & development - A community perspective

Julian T. Inglis and
Canadian Museum of Nature
P.O. Box 3443, Station D
Ottawa, Ontario K1P 6P4, Canada

Elizabeth Reichel
Department of Anthropology
Universidad de Los Andes
Bogota, Colombia

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The Editors welcome case studies which document projects which have been initiated, directed and undertaken by Indigenous Peoples. Many of the books and papers on Indigenous knowledge, or traditional ecological knowledge, are written by academics, or specialists in the subject. The Editors hope that this volume will provide a community view of environment and development issues, and how Indigenous Peoples themselves have responded to these challenges.

If you are interested in submitting a paper, please contact:

Julian T. Inglis

International Program on Traditional Ecological Knowledge
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UN Year of Indigenous People launched

The United Nations launched the Year of the World's Indigenous People with an all-day session in New York City on December 10th, 1992. Indigenous representatives from all over the world addressed the General Assembly, which was attended by over 200 indigenous leaders. Most of the indigenous representatives met on December 8-9 to prepare for the session. It was felt by several that the UN gave only token support for the ceremony which was poorly attended by non-indigenous peoples. Suggestions by the indigenous people for improving working relationships between the UN and themselves included:

- * country and regional meetings between indigenous and UN representatives
- * indigenous liaisons within each agency of the UN
- * indigenous training programs and internships within agencies
- * a permanent UN panel of indigenous experts for ongoing consultation with agency leaders.

A Hopi elder and spiritual leader, Thomas Banyacya, led the group in a ceremony of thanksgiving and hope in which religious leaders, representing the four corners of the Earth, offered prayers in their own languages. [*Action for Cultural Survival*, No. 8, January 14, 1993].

Clinton Administration moves on the Environment

For the first time in 14 years a group of environmentalists was invited to the White House to express concerns on the environment. Attendees felt that it was quite likely that the new government would move to ratify the Earth Summit conventions on biodiversity and climate. A new White House office of ecological co-ordination under Vice-President Al Gore and the inclusion of the head of the Environmental Protection Agency into the cabinet were promised by President Clinton. Gore was given the immediate task of drafting the environmental provisions that the Clinton administration wants to incorporate into the North American Free Trade Agreement [pers. comm. President, World Resources Institute and *Ottawa Citizen*, February 1993]

College of the Bahamas and Canadian Museum of Nature link up on biodiversity survey

The College of the Bahamas has decided to undertake a pilot biodiversity inventory of Pigeon Cay, off eastern Andros Island in the Bahamas. The Bahamas are home to a number of endemic species, those unique to the islands, such as the *Rauvolfia* tree. The inventory will try to cover all terrestrial and marine plants, animals and microorganisms of the island's coppice and coral reef ecosystems. Mr. Cephas Ward, Chairperson of the Natural Sciences Division of the College, with colleagues Lionel Johnson and Lester Flowers, and 20 students

will undertake the survey next May. Dr. Donald Cooper, Director of the Environmental Health Department of the Bahamas, who had met Museum staff during Earth Summit negotiations, suggested that College link-up with Canadian Museum of Nature and take advantage of the Museum's interest and experience in biodiversity inventories.

Dr. Don E. McAllister, Senior Biodiversity Advisor, met with College staff January 17-21 and joined in planning the survey. The Museum will assist in coordinating identification of the specimens. Despite its nearness to Florida, the 700 islands of the Bahamas are not well-explored scientifically, and Ward and McAllister expect that many species new to science will be discovered. Following the pilot study, the partners may carry out a national inventory. Meetings were also held in Nassau with the Bahamas National Trust, responsible for selecting and taking care of protected areas in the islands. Coordination between the College and the Trust will be of mutual benefit. Biodiversity information collected will assist in conservation, resource management, education, ecotourism and the development of new biotechnologies.

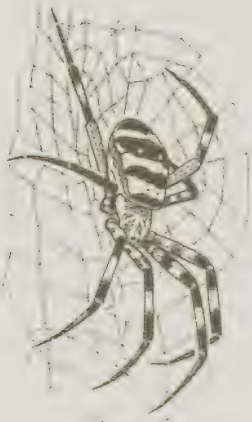


*This species of critically endangered tree, **Rauwolfia nitida**, is found only in the Bahamas where only a handful of individuals survive. The tree's relatives, found in Africa and India, are known for their interesting alkaloids which have sedative and tranquilizing properties and have been employed to reduce hypertension. A biodiversity inventory of the Bahamas might uncover more specimens of this tree as well as other new and interesting species. Gary E. Larson (left) and Pericles A. Maillis (right) of the Bahamas National Trust, are seen next to this tree which they have helped to protect.*

The College of the Bahamas would like to build up a library on the terrestrial, aquatic and marine fauna, flora and microbiota of the Bahamas and neighbouring regions as well as the more general aspects of biodiversity. They would very much appreciate donations of scientific papers and books on these topics from researchers and institutions. Publications may be sent to Mr. Cephas Ward, Chairperson, Natural Science Division, College of the Bahamas, Box N4912, Nassau, Bahamas, or to Don McAllister, Canadian Museum of Nature.

Manitoba spiders

A new checklist of spiders for Manitoba reports 483 species in 10 families, with 139 new provincial records (C.W. Aitchison-Benell and C.D. Dondale. 1992. A checklist of Manitoba spiders (Araneae) with notes on geographic relationships. *Naturaliste canadien* 117: 215-237). Although Manitoba represents only 6.5% of Canada's land area, the 483 species represent 37% of the known spider species in Canada. Analyses of species suggests that the Manitoba spider fauna is closer to that of eastern Canada, than to that of British Columbia.



U.S. Forest Service sued by botanists over biodiversity

Three botanists have filed two legal suits against the U.S. Forest Service to try and force the Service to manage its millions of acres to preserve overall biodiversity, rather than just protecting individual species from extirpation (extirpation is local extinction of a species). The botanists believe that the Forest Service planning fails to take into account the effects of fragmentation by access roads and cuts. The resulting small patches are exposed around their peripheries to the "edge effect", grazing by growing deer populations, invasions by weeds, changes in light, temperature and humidity, etc. The botanists suggested that timber sales be rearranged to leave a few 40,000- to 100,000-acre blocks of forest to develop into roadless old growth, or "diversity maintenance areas." The suits are being opposed by a coalition including paper industry, logging, hunting, and snowmobile interests. [*Science*, 1992, 257: 1618-1619].



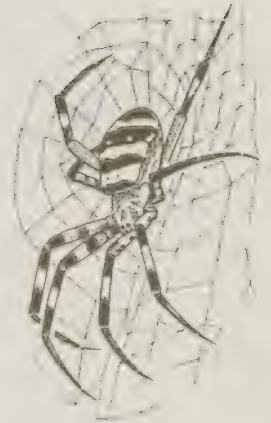
What effect does forest clear-cutting have on the spider fauna?

A recent study compared the spider fauna in forest litter from coniferous forests in different stages of recovery after clear cutting. Traps to sample the spiders were placed in old-growth sites (150-450 years) and in three age clusters of clear cut areas: 4-7, 16-19 and 22-31 years. Visual pursuit spiders dominated clearcuts, while "sit and wait" microweb and trapdoor spiders dominated mature forests. Most of the commonest forest species were established in the wettest sites by 30 years after clearcutting, while species in dry 30-year-old clearcuts more closely resembled spider faunas in shrubby wet 16-year-old sites. This suggests that recovery of natural forest litter species assemblages takes decades and that moisture is an important factor in recovery. Several species are capable of invasion of new sites by ballooning. But observations suggest that forest spider species that survive the removal of trees cannot tolerate for long the conditions that prevail in clearcuts; their subsequent observed absence is not likely to be due to their inability to disperse into these habitats. Catches in traps were higher in the younger stages of forest recovery; catch sizes were interpreted as a measure of activity levels, rather than a measure of population sizes. The closed forest canopy was regarded as important in providing more constant microenvironmental conditions on the forest floor - the light, humidity, temperature and wind, as well as litter structure and depth. Litter habitat, which provides food for the spiders, is destroyed by clearcutting and burning. It will be interesting to study the spider fauna of tree trunks, lower branches and canopy in facilities such as the Western Canada Wilderness Committee's Carmanah canopy walkways. [McIver, J.D., Parsons, G.L. and Moldenke, A.R. 1992. Litter spider succession after clear-cutting in a western coniferous forest. *Canadian Journal of Forest Research* 11: 984-992].



World Wildlife Fund receives donation from Bonne Bell's Cosmetics

In mid-1992 Bonne Bell of Canada presented a cheque for \$24,000 to World Wildlife Fund Canada (WWFC). The cheque will support WWFC's ultimate goal to stop and eventually reverse, the accelerating degradation of our planet's natural environment, and to help build a future in which humans live in harmony with nature. Successful marketing of the Shades of the Rainforest line made the donation possible. Bonne Bell has a policy of "no animal testing" for its products. [*Cosmetics* July 1992, p. 21-22].



U.S. Wild Bird Act Becomes Law

The U.S. Wild Bird Conservation Act was signed into law, 23 October 1992. The Act promotes the conservation of exotic birds by ensuring that all imports into the U.S. are biologically sustainable and humanely treated, and will provide assistance for wild bird conservation and management programs in countries of origin. Address correspondence regarding the Act to: Dr. Robert R. Campbell, Administrator, Convention on International Trade in Endangered Species, Canadian Wildlife Service, Ottawa, Ontario K1A 0H3, telephone (819) 953-1411, fax: (819) 953-6283.

Gene fragment patenting

A reliable source suggests that applications for patents on fragments of genes by the U.S. National Institute of Health (NIH) will be rejected. The rejection will apparently be based on the grounds that their discovery is "obvious." The biochemist, Craig Venter, who was identifying the gene fragments has left NIH to head up a new privately funded Institute of Genome Research (IGR). The latter Institute has obtained \$70 million to continue his work on large scale. IGR may play by the "old rules" and patent only full genes when the function of the gene is known. [*Science*, 1992, 257: 1620].



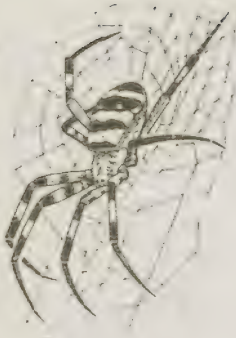
Biological control of purple loosestrife

The exotic weed, purple loosestrife, *Lythrum salicaria*, has been rapidly spreading and displacing native species in wetlands of United States and Canada, following its introduction from Europe. According to the Canadian Wildlife Service, domestic cultivars such as "Morden Rose", "Morden Gleam," and "Mordent Pink" may have been crossing with this spreading stock in the wild. It is therefore advisable that gardeners get rid of all of their purple loosestrife. Three species of insects are being introduced from Europe to act as natural biological controls. These are a root weevil, *Hylobius transversovittatus*, which devours loosestrife roots, and two beetles, *Galerucella pusilla* and *Galerucella californiensis*, which eat the leaves and flower heads. Some 5,000 to 6,000 of these insects will be released in Canada next spring. It will then take six to eight years to start having an effect, according to the Canadian Wildlife Service. [*Gardeners' Journal* September/October/November 1992, p. 11].



B.C. foresters to ensure salmon habitat protected from logging

Enforcement of fish habitat guidelines such as leaving treed buffer strips were left along important salmon streams in areas being logged, has not been fully enforced in the past. The Assistant Deputy Minister of the B.C. Forests Ministry, Wes Cheston, will now beef up inspection of logging operations to ensure guidelines protecting salmon are met. It is planned to include existing fish habitat guidelines in all cutting permits. This will facilitate administration of contracts. The number of inspections will be increased. The



Sierra Club believes, however, that good forestry practices should be put into forest legislation. [Victoria Times-Colonist, 27 August 1992, p. A9].

Task Force on Canadian Biosystematics

The Canadian Museum of Nature has recently announced the formation of a **Task Force on Canadian Biosystematics**. Biosystematics is the science that deals with the classification and naming of living organisms into a series of ranks reflecting their natural evolutionary relationships. It provides an internationally accepted system for retrieving knowledge the world's species, increasingly important in this age of biodiversity for research, conservation, ecologically sustainable resource use, and the new biotechnologies. Study, conservation and wise use of biodiversity faces the problem that only half of Canada's and less than 10% of the world's species are named and classified.

The continued vigour of biosystematics in Canada has been a concern to many individuals and groups for some time. Biosystematics is essential both as a discipline fundamental to many other life sciences and as the scientific basis to deal with the major environmental issues facing us. The **National Workshop on Systematics** held in Ottawa in June, unanimously recommended that the Canadian Museum of Nature strike a Task Force with broad regional and taxonomic representation to plan a national network for biosystematics. The Canadian Museum of Nature is pleased to announce the establishment of this Task Force.

The Task Force will review available information and views on issues such as:

- 1) the adequacy of existing personnel, recruitment needs, and programmes for training,
- 2) the levels of care and development of collections,
- 3) the scope and significance of current research and services
- 4) resources in terms of physical and support facilities, libraries and funding, and
- 5) collaboration among institutions with biosystematic strength and/or needs.



Information and views will be sought from governmental agencies, museums, universities, scientific societies, and other groups. The Task Force will develop the structure and function of a national network to co-ordinate biosystematics scientifically and as applied to social priorities.

As well as addressing these issues, the network will provide a framework within which to further various initiatives including: 1) the development of a Memorandum of Understanding on National Collections in Biosystematics between the Canadian Museum of Nature and the Federal Departments of Agriculture and of Forestry, 2) the broadening of the Biological Survey of Canada to modules beyond terrestrial arthropods, and 3) collaboration between various agencies, such as the Centre for Land and Biological

Resources Research (Agriculture Canada) and the Canadian Centre for Biodiversity (located in the Museum) and the Department of the Environment, to meet Canada's commitments as a signatory and ratifier to the International Convention on Biodiversity.

The initial meeting of the Task Force was held in Ottawa in the third week of December. All interested individuals and institutions interested in supplying information and views to the Task Force are encouraged to contact its Chair, Patrick Colgan, Associate Director of the Canadian Museum of Nature, at P.O. Box 3443, Station D, Ottawa, Ontario K1P 6P4, or by fax at: (613) 952-9282.

HAIKU

*The spring rain
Must have penetrated
Through the leaves
To feed the crystal spring.*

Bashô

*The great Milky Way
Spans in a single arch
The billow-crested sea,
Falling on Sado beyond.*

Bashô

*In the utter silence
Of a temple,
A cicada's voice alone
Penetrates the rocks.*

Bashô



Book and Periodical Niche

TEK TALK. A newsletter on traditional ecological knowledge.

Published quarterly by: International Programme on Tradition Ecological Canadian Museum of Nature, P.O. Box 3443, Station D, Ottawa, Ontario K1P 6P4, Canada. US\$18.00 for 4 issues.

TEK is traditional ecological knowledge. TEK is characteristically developed over hundreds of years through intimate continuous contact with the environment. It is often reflected in detailed direct knowledge or in traditional laws, regulations, spiritual beliefs or taboos. It is often holistic and pragmatic - it works and has contributed to survival of the culture, sustainability in today's language. Traditional knowledge has often been rejected for ethnocentric and religious biases, or simplistic reasons, or ignored. Scientific knowledge is much younger, biologically dating back to the time of Linnaeus in the 1750s. Biological knowledge is gathered in the field and in the laboratory, but stays in the field are often short-term and less intimate - field labs and vehicles isolate one from nature less than hammocks and teepees. Biological field work is often carried out during the summer break, limiting knowledge of seasonal cycles. Much of science is reductionistic rather than holistic. Biology has tended to be male-dominated. Both knowledge paradigms have value. They agree in some areas - taxonomy of birds, for example. Traditional knowledge exceeds scientific knowledge in a number of areas - animal behavior, crop diversity and culture, therapeutic use of rain forest plants, ecology of coral reef fishes, and sustainable resource management. TEK knowledge is rooted in cultures and particular land-, water- and sea-scapes. TEK tends to follow solar and lunar clocks and biological calendars. Women and men both contribute to creating and using TEK. Both forms of knowledge are humanly imperfect and contain error. Most of all, they are complementary.

The purpose of **TEK TALK** is to further the recognition and understanding of TEK, to promote the application of TEK in the decision-making process, to promote networking among those interested in TEK, and to serve the international TEK community.

Two issues of **TEK TALK** have appeared (4 and 6 pages). These issues define TEK, report on the international workshop on TEK held in Winnipeg and the publication of the reports, Canada in September 1991, discusses plans for an international TEK program under the World Decade for Cultural Development, and the UNESCO Environment and Development brief on TEK. There are articles on TEK in Chile, the October 1992 Eco-Ed Conference held in Toronto Canada. The TEK International Program will involve Jim Bourque, former Deputy Minister of Renewable Resources of the Government of the Northwest Territories and Julian T. Inglis. An article by Akoss Ofori-Mensah explains how harvest of West African Giant Snails was sustainably managed through a system of taboos and rules, reinforced by religious beliefs. Nancy J. Turner describes how the Lil'wat (Lillooet) women of western Canada selected fibres, dyed, wove and traded baskets in western Canada. Details include how the cherry bark was cut away from the trunk in a manner that did not harm the trees. Lorraine F. Brooke looks ahead to the next steps to be taken in TEK and Peter Croal about healing the environment using traditional knowledge.

TEK is in vigorous ferment. **TEK TALK** will keep those interested in what activities are going on, discuss directions, and provide a varied feast of traditional knowledge. It will be useful to help indigenous and traditional peoples link together, share knowledge amongst themselves and with scientists, ethnobiologists, conservationists, and resource managers. And it should contribute towards greater harmony between nature and humankind.

Don E. McAllister, Canadian Centre for Biodiversity, Canadian Museum of Nature

Islands, plants and Polynesians: An introduction to Polynesian ethnobotany

Edited by Paul Alan Cox & Sandra Anne Banack. 1991. Dioscorides Press, Portland, Oregon. proceedings of a symposium sponsored by the Institute of Polynesian Studies, Brigham Young University - Hawaii Campus, Laie, Hawaii, ISBN 0-931146-18-6, 240 pp, 16 B&W photographs

In the study of humans, interdisciplinary research has always played a significant role. One area of interdisciplinary research, the use of plants by people and the interaction of plants and people, has profoundly

affected the development of anthropology in North America. Still, the number of ethnobotanists in anthropology today is low. Furthermore, the impact of ethnobotany on botany has not been nearly as strong as it has been in anthropology. Part of the difficulty, as the editors of this volume point out, is that the training required is extraordinarily diverse, covering cultural anthropology, archaeology, and linguistics as well as botany. Most of the contributors to this volume exemplify a burgeoning group of scholars who are acquiring the requisite background. Cox and Banack's new volume is a welcome addition to this growing field, tackling a complex cultural as well as biological region.

Polynesia is a particularly rich research area for examining human and environmental interaction. Archaeologists trace Polynesian origins to what is known as the Lapita culture. Distributed initially in the Bismarck archipelago, the Lapita people started an exploration and colonization of islands to their east by the end of the second millennium B.C. The process led to the colonization of Hawaii by A.D. 300 and eventually led to contacts with South America, the only evidence for which is at least three South American plants that the Polynesians carried home. This is a recent event in human prehistory. Most other places on this planet had been peopled by the early to mid-Holocene at the latest. The potential for examining human impact on pristine habitats in island ecosystems is quite high in Polynesia. It is also an ideal area to see the extent to which people moved with the plants that were important to them. With domesticated plants transplanted to new habitats, the opportunities to explore the consequences of the establishment of domesticated plant populations in new regions is unprecedented. This volume provides fresh insights on these processes and more.

Ten authors present a range of topics dealing with the Polynesian environment, the human role in introducing plants and changing the environment, linguistics, and plant use. The diversity of issues provides for an exciting and relatively thorough examination of the topics by anthropologists, archaeologists, and botanists.

Raymond Fosberg surveys Polynesian environment and ecology with speculative reconstruction of island ecology before people moved in. Fosberg concludes that, at the moment, informed speculation on environments before anthropogenesis is the best we can do today. An enormous amount of research is required to fill the gaps, not just to reconstruct the early Polynesian environments but also the dynamics of a changing environment as people established themselves and intensified their agricultural activities. This chapter left me wondering if the authors in the subsequent papers could actually be contributing anything meaningful. In fact, they do.

Sandra Anne Banack examines the role of plants in voyaging. Boat construction, food, technology for fishing, gifts to gods, compensation to boat builders, and the like, all involve plants. The paper serves to indicate how rich are the data related to one facet, however complex, of Polynesian life--voyaging. Banack points out that plants and voyaging are intimately tied to religion--a boat and a voyage will not be successful solely because of the pragmatics of construction, supplies, skills, and provisioning--but also because of the proper observance of pervasive religious concerns that, among other matters, incorporate plants.

W. Arthur Whistler explores the indigenous and introduced status of plants of use to the Polynesians. The difficulty with making such inferences is acknowledged, but Whistler makes an excellent effort to account for many of the factors that impinge on the recognition of a plant as introduced as native. Seventy-two plants are deduced to be intentional introductions to Polynesia. Unfortunately, in his otherwise good discussion of South American introductions, he misidentifies sweet potato as "yam" (p. 48). Yams are not South American, rather they are Asian. Whistler eliminates bottle gourd as having been present in western Polynesia. Its presence in eastern Polynesia only, is, therefore, strong evidence for its introduction from South America where it has been recovered from early Holocene archaeological contexts. He is apparently unaware that bottle gourd has been recovered from Thailand, Japan, and New Guinea in early to mid-Holocene archaeological contexts. In light of this evidence, the absence of bottle gourd from western Polynesia takes on a problematic new light. Another plant



Whistler interprets on the basis of its distribution and name (*koko'u* in Polynesian and *cocuna* in South America) to be from South America is *Solanum repandum*.

Douglas Yen's eloquent chapter on the origins of cultigens and cultivars in Polynesia is a must-read for economic botanists and archaeologists alike. This outstanding ethnobotanist of Southeast Asia and Polynesia also has extensive experience in archaeological botany. In this chapter he integrates ethnohistory, archaeology, ethnology, ethnobotany, genetics, and archaeobotany. Yen reviews the current status of the argument that Polynesian agriculture was derived from Southeast Asia. A big problem is the absence of rice in Polynesia (p.75). Yen notes that agricultural archaeology in Indonesia, the key to understanding Polynesian origins, is poorly known. Complicating matters is the Polynesian selection of cultigens, for example, the seedless breadfruit which is unknown to the west in Oceania. Particularly noteworthy is the recent archaeological evidence that arboriculture was well underway in the Bismarck archipelago before colonizers moved east to the Solomons. Also there is the fascinating matter of sugar cane domestication. Three parent species appear to have been brought to New Guinea from South China in one case, and from other areas of southeast Asia in the other two cases (p.88).

Karl H. Rensch's paper focuses on the linguistic evidence for the introduction of sweet potato from South America. He examines the variation in the names for sweet potato in Polynesia, the variation of the European reported names and the linguistic reasons underlying some of the variations *heard by* European visitors. Linguistic and collateral evidence promote the hypothesis that the sweet potato reached Polynesia from South America not once, but twice.

Agricultural systems as they operated at the time of European contact are the subject of Patrick Kirch's chapter. He uses ethnohistoric and anthropological data as well as archaeological, environment, technology and cultigen inventories. He records five systems, their differentiation, expansion, intensification, and social context. He concludes that intensification, particularly of taro cultivation, was not just a response to demographic factors, but was related to the appearance of new structural formations in Polynesian society. The most intensified agricultural systems were tied to the rise of chiefly hierarchies.

At least 63 types of edible aquatic plants are known in Hawaii, where documentation is best, according to Isabella A. Abbott's chapter. This category of plants is one of the best examples of why it may be too late to recover pertinent ethnobotanical information on certain aspects of ethnobotany in some cultures. The knowledge of seaweed as a food has been lost in much of Polynesia. Abbott explores some of the reasons for concentrating on seaweed as a food. She proposes that it is related to the lack of female prohibitions from eating invertebrates or plants from the sea. There were many prohibitions against females eating other foods in a male-dominated religion.

Paul Cox looks at the antecedents for herbal medicine in Polynesia - did it begin long before European contact? This may not seem important except that herbal medicines were discounted by early missionaries. It was the collection of information on indigenous medicines in North America that had a strong influence on ethnobotany there. Polynesia has not left a similar legacy. Cox feels that adoption of western medicines was partly

affected by virulent diseases brought by Europeans. This obscured indigenous medicine. He concludes that herbal medicines indeed existed before European contact. Cox also feels that Polynesian medicine represents a body of theory and practise in Oceania. He also explores the differences between western and Polynesian medicine.

Vincent Lebot provides a thorough review of the ethnobotany of *kava* (*Piper methysticum*), a plant with psychoactive properties; it is a narcotic and a hypnotic. Lebot discusses the problem of *kava*'s distribution. It is also a plant that should be of interest to linguists, anthropologists, botanists, geneticists, agronomists and development officers. A single point of origin for this plant is postulated.

No book on the ethnobotany of Polynesia would be complete without considering breadfruit in some detail. Breadfruit provided shelter, fabric, medicine, and food to Polynesian peoples. Diane Ragone's chapter rounds out this volume with a look at the ethnobotany of this plant. She reviews the botany, ethnohistory, storage, preparation, associated rituals, other uses, and legends that pertain to breadfruit.

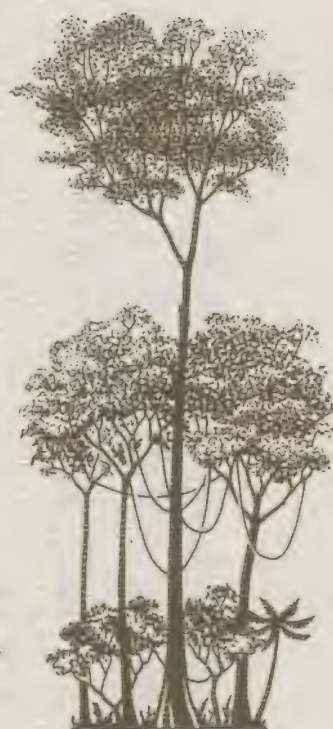
Missing from this collection, in my view, is a synopsis. The editors provide the rationale for the book in the introduction, but do not provide any discussion of the diverse topics and their implications. Normally in a volume of this sort, the editors assess the status of our knowledge on the issues now that the contributions are complete. What is the next step? What are the unanswered questions? In general, what has this volume accomplished? It is not always clear either, how communication among the participants in the original conference affected the outcome of each of the papers. One important theme throughout the volume is the caution we must make in undertaking assessment of the human use of resources in any area. Another critical lesson is that people are actively involved in the dispersal of plants that are important to them. Anthropogenesis should not be underestimated in assessing Pacific island ecology. As Patrick Kirch (p. 130) points out, ethnobotany and paleoethnobotany can contribute to the wider understanding of human cultural and social systems throughout Polynesia, and, if I may be so bold, throughout the world.

Dr. Gary W. Crawford, Department of Anthropology
University of Toronto, Toronto, Ontario

Shattering: Food, politics and the loss of genetic diversity

By Cary Fowler and Pat Mooney. 1990. University of Arizona Press, 1230 North Park Avenue, Suite 102, Tucson, Arizona 85719, U.S.A. 278 pp. Hardcover, ISBN 0-8165-1154-3, US\$29.95, paper, ISBN 0-8165-1181-0, \$12.95.

The interplay of genetic engineers, multinational seed-pesticide-fertilizer conglomerates, intellectual property rights, farmers' rights, loss and *in situ-ex situ* conservation of diversity of wild relatives of crops, are all discussed in this topical book, dressed with internal documents and personal conversations.



Environmental Reviews

A new quarterly journal, ISSN: 1181-8700, starting in 1993. Available from: Subscription Office, CB Research Journals, National Research Council of Canada, Ottawa, Ontario K1A 0R6, Canada, telephone: (613) 993-9084, fax: 952-7656. \$25 a year in Canada + GST, \$31 for other countries.

This is a new journal dealing with the environmental sciences, with the first volume to be published early in 1993. The authorship and scope will be international, with critical reviews being invited as well as submitted. The emphasis will be on the effects and responses of both natural and man-made ecosystems to anthropogenic stress. More specific areas to be covered will include climate change, forest management and harvesting impacts, forest decline, air pollution, ozone, acid rain, pesticide use and effects, lake acidification, marine pollution, ecology of oil spills, toxic chemicals in aquatic and terrestrial food chains, heavy metals in the environment, ecological impacts of dams, biological control, food chain biomagnification, reclamation of contaminated land, rehabilitation of polluted aquatic ecosystems, impacts of toxicants on nutrient recycling and on microbial populations, erosion and agriculture, agroforestry and bioindicators. The Editor is: T.C. Hutchinson, Trent University, Peterborough, Ontario, Canada.

Toward sustainable communities. A resource book for municipal and local governments.

By Mark Roseland. 1992. National Round Table on the Environment and the Economy, 1 Nicholas Street, Suite 1500, Ottawa, Ontario K1N 7B7, Canada. 340 pp. Tel.: (613) 992-7189, Fax: 992-7385. ISBN 1-895643. Disponible en français. Paperback

This pocket book contains chapters on sustainable development for managers, national waste reduction, decision making for sustainable development, preserving our world, the Earth Summit, towards sustainable communities, trade, environment and competitiveness. It is packed with good practical advice on recycling, energy conservation (painting asphalt roofs white can save millions), the economics of parking, public transportation, and tree planting (can save \$30-\$180 per home in heating/air conditioning). Examples are given from cities around the world. Resource sources and references are provided for each chapter. It's a great little book!

Conserving biodiversity in the context of Great Lakes Biosphere Reserves

Heritage Resources Centre. 1992. Proceedings of a Planning Workshop held at the University of Waterloo, March 26-27, 1992. University of Waterloo in cooperation with Environment Canada/Parks Service under Canada's Green Plan. 17 pp. + 3 appendices, including maps.

The Workshop's objectives were to review current Canada/Man and Biosphere proposals to develop Great Lakes Basin biosphere reserves, assess current status of biodiversity conservation in the Basin, to provide current information on initiatives on biodiversity conservation, develop a consensus on issues, commit on follow-up steps to initiate actions. The Workshop concluded that protected areas did not span the spectrum of the basin's ecological diversity, or lacked necessary size or buffering, or were islands in



degraded land. Case studies would be made on reserves in the Niagara Escarpment, Long Point, and the Southern Appalachian cluster. It was recognized that there was a need for much a larger data base on species/populations and communities/ecosystems. The report did not specifically mention the need for taxonomic baseline work, broadening the perspectives of biodiversity beyond wildlife/fisheries/trees or the poor representation of aquatic ecosystems in protected areas. The appreciation of biodiversity needs broadening to include lower plants, terrestrial and aquatic invertebrates and microorganisms. Shouldn't there be some deepwater Great Lakes reserves as well as shallow water reserves such as Fathom Five and coastal wetlands?

Canadian aid and the environment. The policies and performance of the Canadian International Development Agency

By Roger Ehrhardt, Arthur Hanson, Clyde Sanger and Bernard Wood. 1981. A joint study by The Institute for Resource and Environmental Studies, Dalhousie University and The North-South Institute. 93 pp. ISBN 0-920494-22-6. Paperback, Can\$5.50 from The North-South Institute, 55 Murray, Suite 200, Ottawa, Ontario K1N 5M3, Canada.

This book examines and evaluates environmental procedures followed by CIDA, attempts to increase awareness of CIDA staff towards environmental problems and to prepare a set of guidelines on environmental aspects of development projects. In the decade that has passed since this book was written, environmental awareness has increased, and to that degree the study was effective. However, in talking to CIDA officials one still has the impression that CIDA's primary focus is on development. That impression is supported by the budget. According to Monique Landry, Minister for External Relations and International Development, 10% of CIDA's budget has been devoted to environmental projects in recent years. This seems insufficient to meet the needs of the conventions or Agenda 21, according to the Earth Summit's Secretary-General, Maurice Strong. Furthermore the government in early December 1992, cut the international assistance budget by 10% or \$642 million (*Ottawa Citizen*, 3 December 1992, p. B8). There was no indication whether environmental project funding be included or excluded from the 10% cut.

The nature of southeast Alaska

By Rita M. O'Clair, Robert H. Armstrong and Richard Carstensen. 1992. Alaska Northwest Books, Anchorage, Seattle. A division of GTE Discovery Publications, Inc. 22026 20th Avenue SE, Bothell, Washington 98021, U.S.A. 254 pp. Paperback US\$17.95, Canadian\$21.95. ISBN 0-88240-419-9.

There are two kinds of nature guides, one that helps you identify the animal or plant, but little else, another that has something to read along with the identification material. *The nature of southeast Alaska* has material to read, and it is fascinating material. As well, it is illustrated with 130 delightful black and white drawings and 64 color photos.

The chapter on **Habitats** covers everything from alpine to the rocky intertidal, **Mammals** includes the big as well as some of the little ones, **Birds** talks about winter adaptations as well as the Vancouver Canada Goose and American dipper, **Fish** describes the Dolly





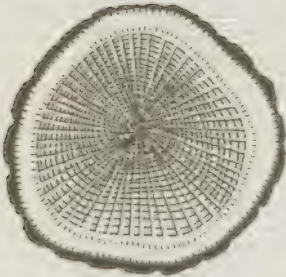
Varden Charr and Pacific sand lance, **Invertebrates** the mussels and butterflies, and there are other chapters on **Fungi** and **Lichens**, and the **Plants**.

Unlike many nature books which repeat the same material on the same well-known species, this introduces the reader to neat beasts like pseudoscorpions. Eight mm or a third of inch long, these tiny false scorpions have four walking legs and pincers; the latter inject an anaesthetic into their prey. An elaborate hour-long courtship dance ends with the male leading the female by the pincer over a freshly deposited spermatophore, which she takes up. The female makes a silk nest and broods the young. The bird's nest fungus grows a cup-like structure containing egg-like packets of spores. When a large drop of water hits the "bird's nest" the spore packets are propelled upwards and outwards, dispersing them to new habitats, away from the "parent" fungus. The "About the Authors" does not reveal that Dr. O'Clair once worked for the Canadian Museum of Nature as an invertebrate zoologist. Buy this book for the intriguing stories about little-known nature, whether you live in Alaska, nearby Canada, or far away. It would make a good gift.

Don E. McAllister, Canadian Museum of Nature.

Forestry on the hill

By the Canadian Forestry Association, a federation of provincial forestry associations, 185 Somerset Street West, Suite 203, Ottawa, ON K2P 0J2, Canada. Telephone (613) 232-1815, Fax: 232-4210. No ISBN.



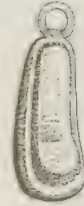
Forestry on the hill (FOH) reviews issues of interest to the Canadian forest industry and the public. FOH provides a service in communicating arguments favoring current forest practices plus some alternative views. Following are some comments on the 1991 special issue on the use of herbicides in forest management; a limited number of copies are available at \$6/copy plus \$1.90 postage and 7% GST from the above address.

Of the 24 articles 75% are written by people in the wood fibre industry, federal or provincial governments or chemical/pesticide industry. Spokespersons for those groups are united in considering herbicides a useful or essential tool in forest management, that herbicides are well-tested and regulated, and that herbicides pose little threat to wildlife or humans. They play down the quantities used on forests, compared agriculture applications -less than 0.5%, though over a million litres were aerially sprayed on Ontario forests in 1990. The data cited suggest that herbicides significantly increase wood volume production, 200% in one article and 300-4200% in another article, if one accepts those figures as representative. They speak about the unbalanced public information and attitude, attributed to chemophobia. The articles underline the large economic and employment benefits of the forest industry, the implication being that herbicide use materially underlies these benefits.

Other articles put forward the views of environmental, church and union groups on herbicides. Finnish studies are quoted indicating that herbicides affect wildlife, reduce available soil nutrients, and increases the proportion of sick and dead trees. Increased incidence of malignant lymphoma in humans is linked to prolonged exposure to certain herbicide compounds or to the chemical carriers that help deliver the biocide.



What is not included are data on impacts of pesticides on mycorrhizal fungi and other soil biota, key partners in recycling soil nutrients, nor the impact of weed elimination on soil cover and erosion. The arguments in this report are restricted to "use herbicides or not" in the present system of forest management. New paradigms, such as selective logging or contour strip logging with natural regeneration are not discussed. Yet such paradigms might need little or no application of herbicide. Is it not time to look beyond defending the status quo, or to minor adjustments to it? Industry and government forestry departments should test ecologically sustainable approaches. One Alberta company, Ziedler Forest Products, will be reducing the size of clearcuts by four-fifths, will eliminate slash burning and herbicides, practice selective cutting, and plant multiple species; the company is to be complemented for the directions it is taking.



*Don E. McAllister, Canadian Museum of Nature, P.O. Box 3443, Station D,
Ottawa, ON K1P 6P4, Canada.*

The fishes of Alberta

By Joseph S. Nelson and Martin J. Paetz. 1992. The University of Alberta Press, Athabasca Hall, Edmonton, Alberta T6G 2E8 and University of Calgary Press, 2500 University Drive, N.W., Calgary, Alberta T2N 1N4, Canada. Second edition. 437 pp., illus. Hardcover, ISBN 0-88864-235-0, Canadian \$34.95; Paperback, ISBN 0-88864-236-9, \$24.95.

Alberta's fish fauna consists of 51 native species and 8 introduced species. These include species of Arctic, Pacific and Mississippian-Missourian origin. Nelson and Paetz's *Fishes of Alberta* provides an admirable guide, with enhancements over the first edition that makes it well worth its purchase, even if you should own the first.

The species accounts include the following sections: Names (common and scientific with derivation), Description (color, body and size), Range (Alberta and general), Biology and Historical Notes. Each account is accompanied by an illustration, many in color, and a spot distribution map (some species like the deepwater sculpin are not mapped). Spot distribution maps have the benefit over shaded ranges, of providing precise information on geographic occurrence. That makes it much more useful for anglers, conservationists and resource managers.

Introductory chapters discuss fishing in Alberta, fish management, ecology, faunal origin, species concepts and classification, maps keys and definitions. Conservation unfortunately is not given a separate write-up, but is addressed at times in the species accounts, e.g. effects of hatchery introductions on native fish stocks of rainbow trout.

The new edition has about twice as much information as the last one, text-wise. Knowledge of distribution has increased, e.g. known range of the pearl dace has been doubled. The base maps are much more detailed. The paper in this edition has a matte finish, unlike the old edition; matte is better for field guides, less annoying reflection, and matte pages do not stick to one another after wetting. Some of the color photos are not up to the high standard of the rest of the text. The habitat photos, on the other hand, give a good impression of the variety of stream-scapes in Alberta.



This is an excellent guide, highly informative with a well-laid design out. I highly recommend it.

Don E. McAllister, Research Curator of Fishes, Canadian Museum of Nature

AAZPA/CAZPA Annual Conference Proceedings 1992

American Association of Zoological Parks and Aquariums/Canadian Association of Zoological Parks and Aquariums annual conference held 13-17 September 1992 in Toronto, Canada. Paperback, 574 pp. Obtainable from AAZPA Office of Membership Services, Oglebay Park, Wheeling, WV, U.S.A. 26003-1698 at US\$40 for members, \$45 educational, and \$70 non-members.

Several sections and papers involve biodiversity issues, including those on animal rights, conservation (legislation, genetics, demography, role of zoos, education (multimedia, live via satellite, deepsea science, impact of people), environmental enrichment for zoo animals), culture of marine and freshwater fishes, invertebrate conservation and breeding, and the Biodome of Montreal. Among more the more unusual invertebrates being kept at zoos/aquaria are ants, beetles, jellyfishes, snails and corals. This report gives a good overview of the contributions that zoos and aquaria are making towards *in situ* conservation of biodiversity, both globally and locally in small zoos.

Global Environment Facility, A bulletin on the Global Environment Facility

Published by the Administrator of the Global Environment Facility, The World Bank, 1818 H Street, N.W., Washington, D.C., U.S.A. Telephone: (202) 473-1053. Number 7, December 1992.

The **Global Environment Facility (GEF)**, an agency of the World Bank, was chosen as the interim funding mechanism for the Biodiversity and Climate Conventions, and was also endorsed by Agenda 21 in Rio. GEF was to be controlled by the Conference of the Parties, the signers of the conventions. How GEF is run, how well it is funded, and how it chooses projects to be funded, will be critical to the success of the goals of the Earth Summit and the survival of the Earth and its life forms. The GEF bulletin is a welcome source of information on what is going on.

The GEF is currently undergoing restructuring to make it better able to help Southern countries tackle global environment problems. The bulletin announced that 40 countries were to meet in Abidjan, Cote d'Ivoire, December 3-5, 1992 to consider proposals for restructuring. Further, some 50 NGOS from 40 countries were to meet with the GEF implementing agencies, December 1-2, 1992, to consider GEF structure, to review projects in the GEF portfolio, improve the consultation process, and discuss how to fund travel to attend GEF meetings.

The bulletin also reported on the Workshop on Land Degradation and Desertification which met in Nairobi, October 28-30 to discuss the technical implications to make land degradation eligible for GEF funding. The GEF and Regional Development Banks (European Development Bank, Inter-American Development Bank, African Development Bank and Asian Development Bank) met in Washington, D.C. to work towards drafting



a framework agreement so that the regional banks could act as GEF cooperating and executing agencies. The Conferences of the Parties will probably want to turn a critical eye on both of these developments, and potential links with the Commission on Sustainable Development, to ensure that the proposed associations do not interfere with clear lines of accountability. Questions arose as to GEF membership at the regional bank meeting. The Chair of GEF expressed the view that membership to GEF was open to all participating states and that there would be no membership fee. He felt that it was likely that GEF funding would be on the order of \$2.5 to \$4 billion. The Secretariat of the Biodiversity Convention, but not that for the Climate Convention, had applied to GEF for funding. He made clear that it would be the Conference of the Parties which would determine program priorities and funding eligibilities. The Chair reported that there would be a meeting between himself, the Executive Director of UNEP (which acts as secretariat for STAP), the chair of STAP, and 16 distinguished scientists from all over the world to advise on the scientific underpinning of GEF. He reported on a review of possible decision making mechanisms for GEF, consensus, vote-taking, or organization into constituencies with weighted votes. The Chair also responded to a question of how independent GEF would be from the World Bank and the two other implementing agencies, UNEP and UNDP.

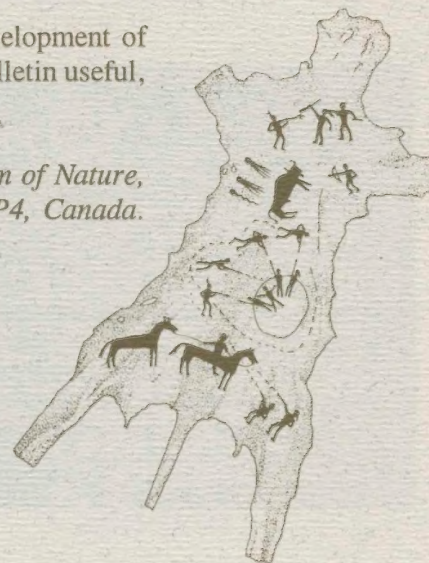
A report, *Strategic Issues for the GEF*, prepared by Charles Barber of the World Resources Institute, provided the final paper in the bulletin. It raised a number of questions including how one chooses among nations in allocating funding, the voices and role of NGOs, transparency, accountability and democracy. It reported a consensus that traditional development assistance methods have largely failed to meet their objectives, but that GEF continued to function in a slightly modified World Bank project mode - funding large-scale projects, developed and managed in large part by expatriate experts in a limited time-frame. The report suggested a wider range of funding modalities, more effort on capacity building, and recommended that the GEF should think much more seriously about the role of NGOs and community participation. The report did not mention indigenous peoples, although perhaps it was assumed that they were represented by NGOs or community organizations.

This bulletin will be useful for anyone following the restructuring and development of GEF. Developing countries, developed countries and NGOs will find the bulletin useful, but will want to leaven it with independent evaluations.

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Canadian Museum of Nature

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ATLANTIC REGION PROTECTED AREAS WORKSHOP

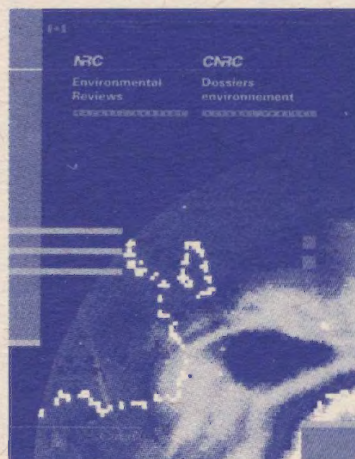
The Atlantic Region Protected Areas Working Group and the New Brunswick Department of Natural Resources will be co-sponsoring "Protecting Our Natural Heritage." The workshop, which is scheduled for June 11th - 12th, will be held at the Forestry Complex in Fredericton, N.B. Participants will include representatives from government and non-government organizations, academics and interested individuals. Among the topics to be discussed are system planning, ecological integrity, private stewardship, forest conservation and biodiversity. The benefits and scope of the proposed Atlantic Region Protected Areas Network will also be discussed. Reasonably priced accommodation will be available at the Forest Ranger School. For a registration package, or more information, contact Eric Hundert, Environment Canada, 15th Floor, 45 Alderney Drive, Dartmouth, Nova Scotia, B2Y 2N6; or Judy Loo-Dinkins Forestry Canada, P.O. Box 4000 Fredericton, New Brunswick, E3B 5P7.

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Idema

The insanity of our current bizarre financial arrangements with the Third World is even more apparent when one realizes that fully half all the Third World Debt has been accumulated in order to purchase weapons with which to wage wars amongst themselves... Stopping these wars (partly by choking off the obscene flow of advanced weaponry from the industrial world) is one of the single most important steps toward environmental protection the world can take.

Al Gore (1992). Earth in the balance. Ecology and the human spirit.

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